THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1892.] LONDON, AUGUST 15, 1899. [51ST YEAR. PRICE 6d.

ABSALOM HARROP
(Maker to the Admiralty),
FITZROY BELLOWS WORKS,
SHEFFIELD.

MANUFACTURER OF THE
PATENT CIRCULAR DOUBLE & SINGLE
Blast Bellows.

Patent Portable Forges, Vices, & Vice-Benches, Patent Tue Irons, Anvils Swage Blocks, &c.

Stocks and Dies, Hammers, and Smiths' Tools in general.

Telegraphic Address: "BELLOWS, SHEFFIELD."

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . . 10,500 Cubic Feet.
Illuminating Power . . . 16·4 Candles.
Coke . . . . . 68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to
The Wallsend & Hebburn Coal Company, Ltd.
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.
CHESTERFIELD.

— ESTABLISHED 1830. —
PARKER & LESTER,
Manufacturers & Contractors.

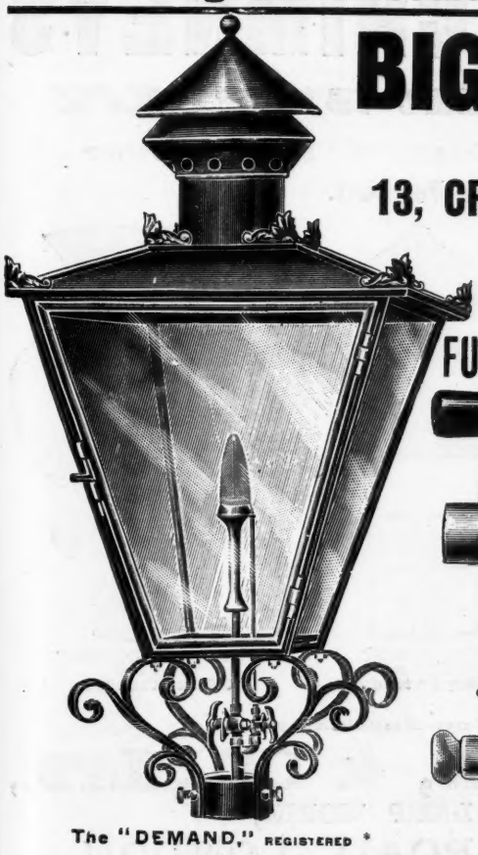
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores, for Gas and Water Works.

WORKS:
ORMSIDE STREET, OLD KENT ROAD,
LONDON.

ROBERT MARSHALL;
CANNEL COAL MERCHANT,
97, WELLINGTON STREET, GLASGOW.
Prices and Analysis of all the Scotch Cannels on Application.

Wrought-Iron
TUBES
And Fittings and Accessories.

LAMBERT BROS., WALSALL,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM,
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF
WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.



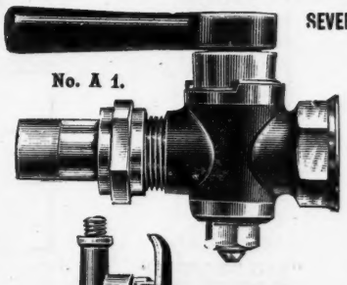
The "DEMAND," REGISTERED *

BIGGS, WALL, & CO.,
GAS AND WATER ENGINEERS,
13, CROSS STREET, FINSBURY PAVEMENT,
LONDON, E.C.

WRITE FOR OUR PRICE LISTS OF
FULL-WAY MAIN TAPS & LANTERN TAPS.
SEVERAL DESIGNS SHOWN BELOW.

No. A.

No. A 1.

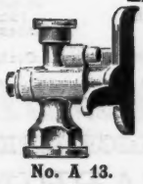


THESE TAPS ARE
FULL-WAY
AS SHOWN.

SUPERIOR QUALITY AND FINISH IN GUN METAL.

LANTERN TAPS.

No. B 10.



No. A 13.

No. A 12.

No. A 1.

*Specially constructed for New Incandescent Burner.

MAURICE GRAHAM,
Managing-Director.

Telegrams:
"ACCOUPLE, LEEDS."

GRAHAM, MORTON, & CO.

— LIMITED —

INCLINED RETORTS
AND ALL CLASSES OF
ELEVATING & CONVEYING MACHINERY
— Contractors to Her Majesty's Government. —

LEEDS.

JOSEPH EVANS & SONS,

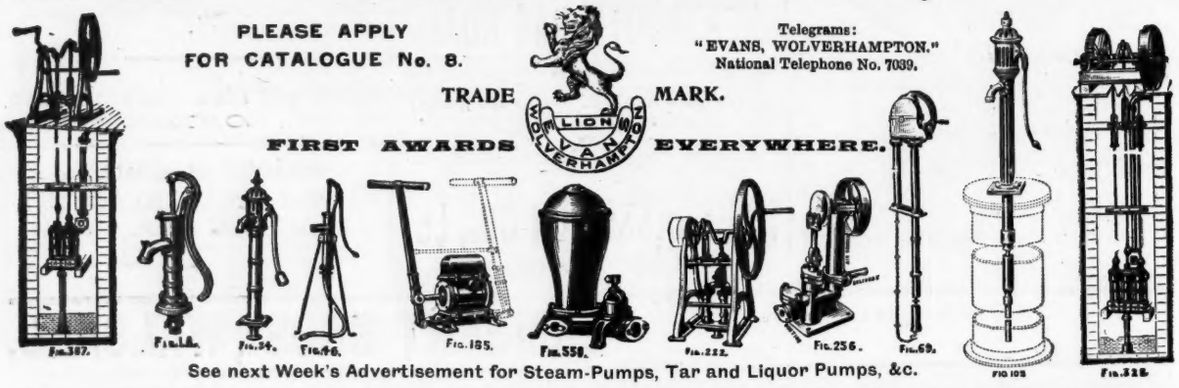
CULWELL WORKS,
WOLVERHAMPTON.

PLEASE APPLY
FOR CATALOGUE No. 8.

Telegrams:
"EVANS, WOLVERHAMPTON."
National Telephone No. 7039.

TRADE MARK.

FIRST AWARDS EVERYWHERE.

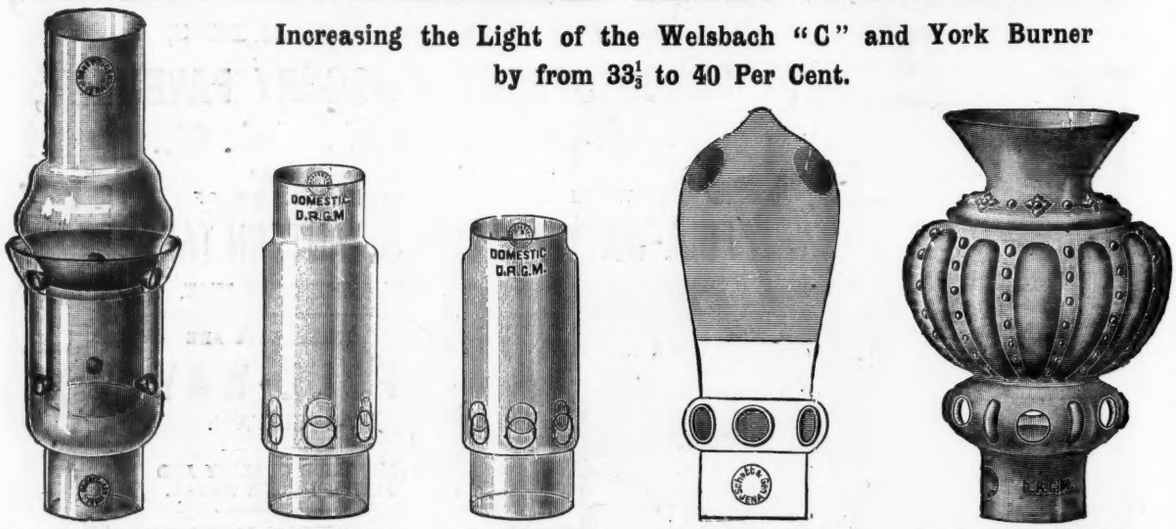


See next Week's Advertisement for Steam-Pumps, Tar and Liquor Pumps, &c.

JENA PATENT CHIMNEYS

WITH LATERAL AIR SUPPLY

Increasing the Light of the Welsbach "C" and York Burner
by from 33⅓ to 40 Per Cent.



The "SUSPENSION SET" for Street Lighting and for Draughty Places.

"THE NORMAL" for Street Lighting.

"THE DOMESTIC" to pass ordinary Incandescent Globes and Shades.

"THE PATENT BULB" and Ceiling Protector.

"THE COMBINATION" Globe and Chimney Combined.

Price Lists and full Particulars on Application.

FALK, STADELMANN, & CO., LTD.,

SOLE LICENSEES, VERITAS LAMP WORKS,

83, 85, & 87, FARRINGDON ROAD, LONDON.

THE BARROWFIELD IRON-WORKS, LIMITED,

LONDON OFFICE:
6, LITTLE BUSH LANE, CANNON STREET.

Late LAIDLAW, SONS, & CAINE, Limited,

GLASGOW.

Telegraphic Address:
"GASOMETER."

MANUFACTURERS OF ALL KINDS OF GAS PLANT.

RETORT-BENCH FITTINGS; SIEMENS'S REGENERATIVE AND ORDINARY FURNACES;
CONDENSERS, EXHAUSTERS, AND ENGINES; SCRUBBERS, WASHERS;
PURIFIERS, WITH PLANED AND CEMENT JOINTS,
DRY AND HYDRAULIC CENTRE-VALVES;
HYDRAULIC AND HAND-POWER LIFTING APPARATUS;
GASHOLDERS, SINGLE-LIFT & TELESCOPE; CAST & WROUGHT-IRON TANKS,
STATION METERS; GOVERNORS; SCREW AND RACK VALVES;
FOUR-WAY COCKS AND HYDRAULIC VALVES;
CAST-IRON GAS, WATER, & STEAM PIPES & CONNECTIONS; WROUGHT-IRON TUBES & FITTINGS;
IRON ROOFING, MARKET BUILDINGS, BRIDGES, GIRDERS, STEAM BOILERS,
PROMENADE PIERS AND LOADING WHARVES.

MANUFACTURERS OF OIL PLANT OF EVERY DESCRIPTION.

HENDERSON'S Patent Retorts, Condensers, Stills, Cast and Wrought Iron Tanks, Ammonia Stills, Wrought-Iron Gas-Mains, &c., &c.

DESCRIPTIVE SPECIFICATIONS AND ESTIMATES ON APPLICATION.

GEORGE ORME & CO.,

(BRANCH OF METERS LIMITED),

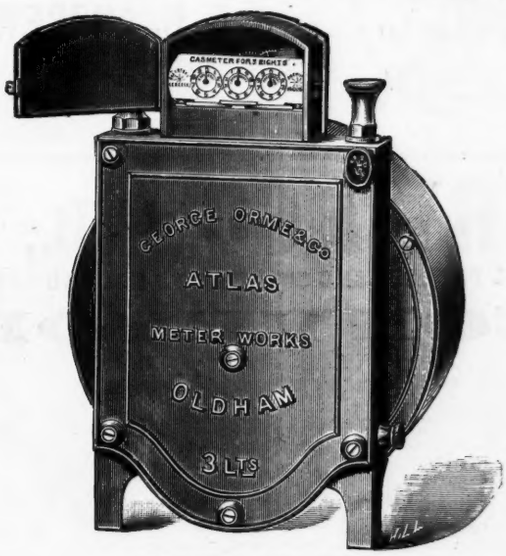
MANUFACTURERS OF IMPROVED WET AND DRY GAS-METERS,

Telegraphic Address: "ORME, OLDHAM."

ATLAS METER WORKS, OLDHAM.

National Telephone No. 93, OLDHAM.

No. 200.



WET GAS-METER IN CAST-IRON CASE.

DRY GAS-METER IN STRONG TIN-PLATE CASE

ORME'S GAS REGULATOR FOR STREET LAMPS.

AS ILLUSTRATION NO. 200,

Adopted by the leading London and Provincial Gas Companies. More than 150,000 now in use.

Main Gas Cocks, Pressure-Gauges, & all descriptions of Gas, Water, & Steam Fittings in stock.

Illustrated Price Lists and full Particulars on application.

NEWTON, CHAMBERS, & CO.,

LIMITED,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

Established 1790

LONDON OFFICE: 19, Great George Street, WESTMINSTER.

Telegraphic Addresses: "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, & CONTRACTORS.

Manufacturers of every description of

PLANT, APPARATUS, and MACHINERY for GAS and CHEMICAL WORKS.

RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

CONDENSERS, SCRUBBERS, and WASHERS.

PURIFIERS with Planed Joints a Speciality.

Patent CENTRE-VALVES, RACK and SCREW VALVES, WOOD GRIDS, and SCRUBBER-BOARDS, CAST-IRON MAINS, and SPECIALS.

STRUCTURAL WORK, COLUMNS, GIRDERS, and ROOFING.

GASHOLDERS, Cast-Iron or Steel Tanks.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (Special Quality) for Engine Cylinders. GAS COAL famous for its UNRIVALLED EXCELLENCE.

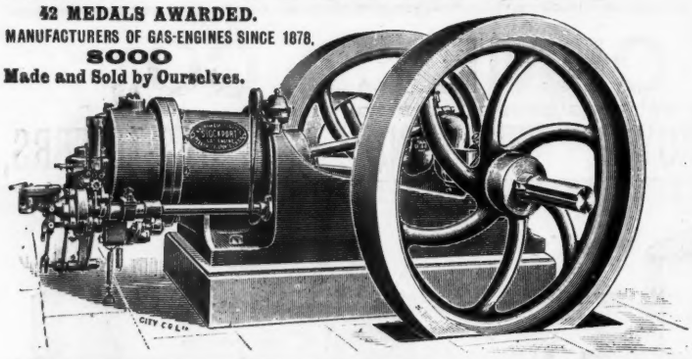
NEW DESIGN "STOCKPORT" GAS-ENGINES

42 MEDALS AWARDED.

MANUFACTURERS OF GAS-ENGINES SINCE 1878.

8000

Made and Sold by Ourselves.



With Otto Cycle and our own Patented Improvements.

All Sizes from 1½ H.P. to 250 Brake H.P.

SEND FOR LATEST PRICE LIST.

The Greatest Brake H.P. given for the Smallest Gas Consumption.

SIMPLE IN EVERY DETAIL.

J. E. H. ANDREW & CO., LTD.

REDDISH, near Stockport.

London Address: 80, QUEEN VICTORIA STREET, E.C.

DEPÔTS IN ALL THE PRINCIPAL TOWNS.

BARRY, HENRY, & CO., LTD.,

ABERDEEN, SCOTLAND, and 64, Mark Lane, LONDON, E.C.

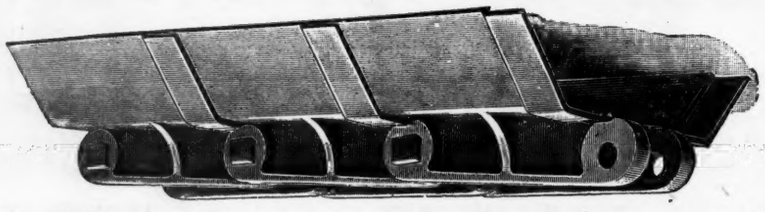
SOLE MAKERS OF HACK & PIGGOTT'S PATENT COKE-CONVEYING PANS AND LINKS COMBINED.

COKE-CONVEYORS.

Specialities:

TRANSMISSION OF POWER.

Rope and Belt Pulleys, Spur and Bevel Wheels, Shafting and Couplings, Pedestals, and Fixings.



Specialities:

TRANSMISSION OF MATERIALS.

Conveyors, Elevators, Grinding Machinery, Motors.

The only Coke-Conveyor which has proved a thorough success.

ALSO HACK AND GILES' PATENT CONVEYOR PAN LINKS.

WRITE FOR PRICES AND PARTICULARS.

The fullest Inquiry invited. Can be seen at work in some of the principal Gas-Works in the United Kingdom, where they are giving the utmost satisfaction.

WELSBACH INCANDESCENT GAS-LIGHT.

INCANDESCENT STREET LIGHTING.

NEW

WELSBACH BURNERS

25 Candles per Cubic Foot of Gas.

SUPPLIED IN SIX SIZES, CONSUMING FROM ¾ TO 7 CUBIC FEET OF GAS PER HOUR.

For Street Lighting the sizes recommended are—

Nos. 2, 3, and 4.

No. 49.

To ensure success with the New Welsbach Burners, it is essential that they should be fitted in well constructed and thoroughly rain and wind proof lanterns.

No. 45.

THE GAS LANTERNS MANUFACTURED BY THE WELSBACH INCANDESCENT GAS-LIGHT COMPANY, Ltd., are of the best Workmanship and Design.

THE WELSBACH ANTI-VIBRATION ATTACHMENT enables the new Welsbach Burner to be used with the greatest economy in renewal Mantles for Street Lighting, or otherwise, notwithstanding the severest vibration.

PRICE LIST ON APPLICATION.

The Welsbach Incandescent Gas-Light Co., Ltd.,

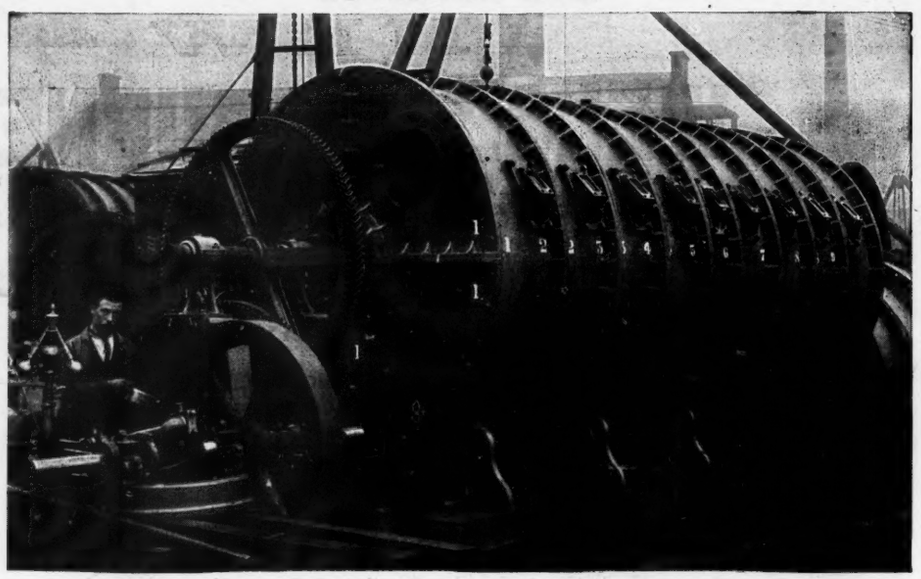
YORK STREET & PALMER STREET, WESTMINSTER, LONDON, S.W.

W. C. HOLMES & CO.'S
PATENT "NEW" SCRUBBER-WASHER

HORIZONTAL TYPE.

Machines of this and Vertical Type erected last year and now on order, equal to 55,270,000 cubic feet per diem.

Results guaranteed.



TELEGRAMS: "Ignitor, London." "Holmes, Huddersfield."

WORKS: HUDDERSFIELD.

MACHINE ERECTED AND WORKING IN YARD PREVIOUS TO SHIPMENT.

NOTE.—Since Improvements patented in 1895-1897, **71 MACHINES**, equal to a daily Capacity of **72,500,000 CUBIC FEET**, have been erected, or are at present on order.

LARGEST MANUFACTURERS IN THE UNITED KINGDOM OF GAS-RETORTS,

HORIZONTAL or INCLINED; also Makers of SEGMENTAL RETORTS of all SECTIONS.

PATENTEES OF MACHINE-FLANGED RETORTS

TELEPHONE No. 8010.

DIBDALE WORKS B. GIBBONS, JUNR., LTD. DUDLEY.

Telegraphic Address: "MACHINE, LOWER GORNAL"

SPECIAL BRICKS and BLOCKS of every description for GENERATOR and REGENERATOR FURNACES.

"ABC" Code and UNICODE used for Telegrams and Cablegrams.

Large Stocks of Bricks of all sizes, Burrs, Boiler Seating Blocks and Covers, Plain and Rebated Tiles, &c., &c.

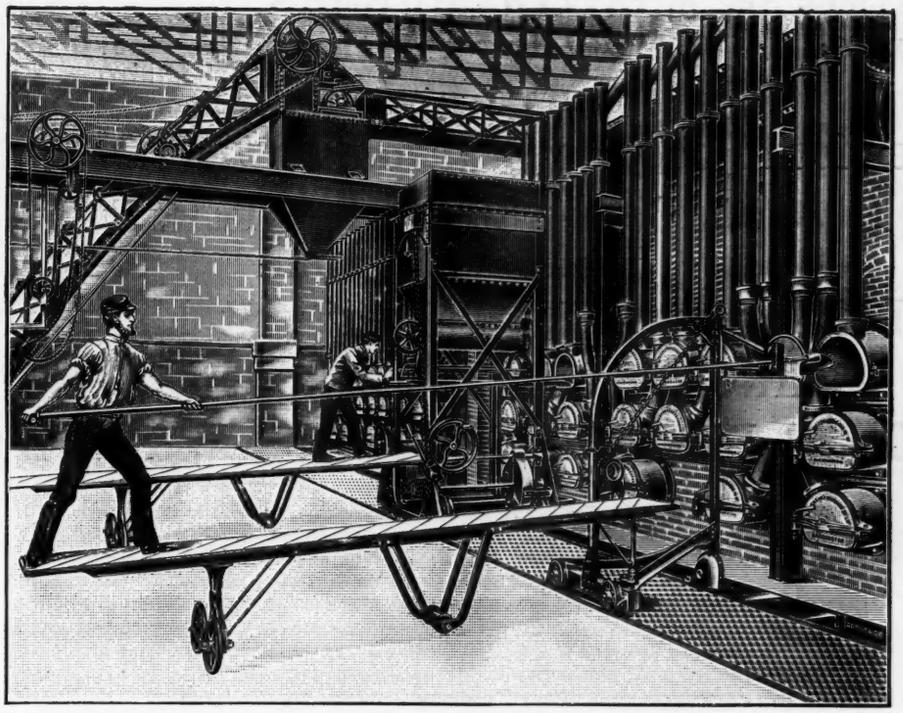
RETORTS and other FIRE-CLAY GOODS CAREFULLY PACKED for EXPORT.

FOREIGN and HOME COPIES of ILLUSTRATED CATALOGUES on Application.

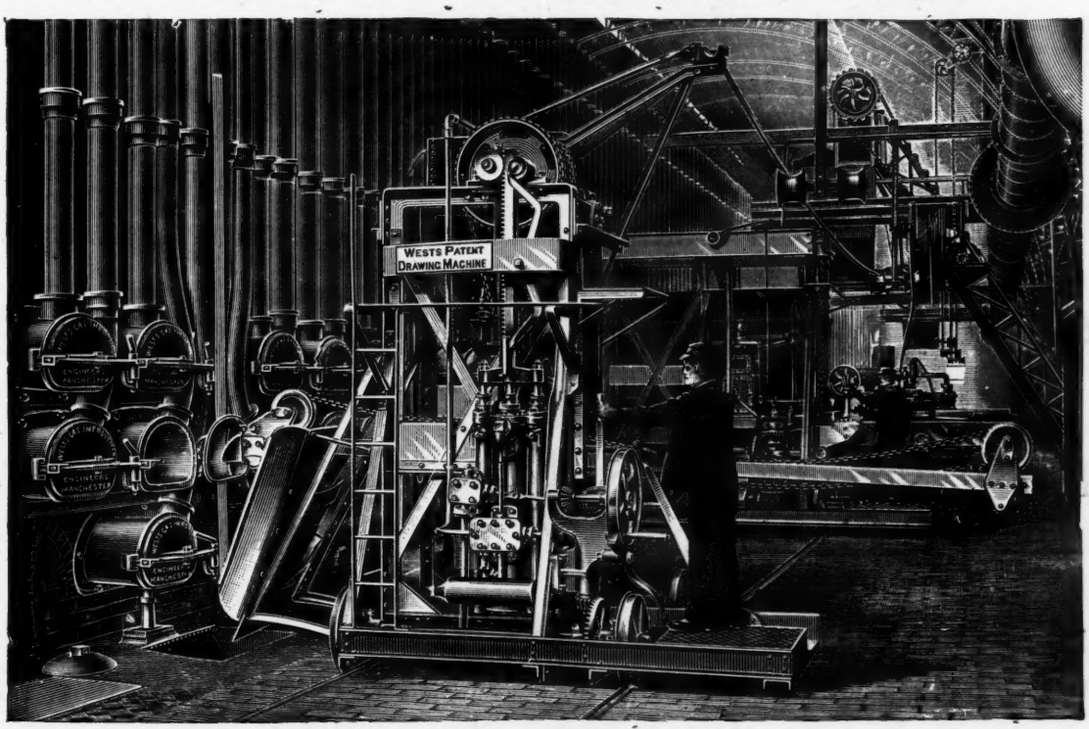
WEST'S GAS IMPROVEMENT CO., LTD.

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER;

And 104, Queen Victoria Street, London, E.C.



West's Manual Charging and Drawing Machines.
NOTE: The Hoisting Gear on Charging Machine may be driven by Hand or Power.



West's Compressed-Air Drawing and Charging Machines.

Contractors for

West's Patent Regenerators, Retort-House Plant and Machinery.

WILLEY & CO.

Gas Engineers, Ironfounders, and Contractors.

CHIEF OFFICES AND WORKS: **ST. THOMAS, EXETER.** Telegrams: "Willey, Exeter." Telephone: 132 and 263.

METER-WORKS:

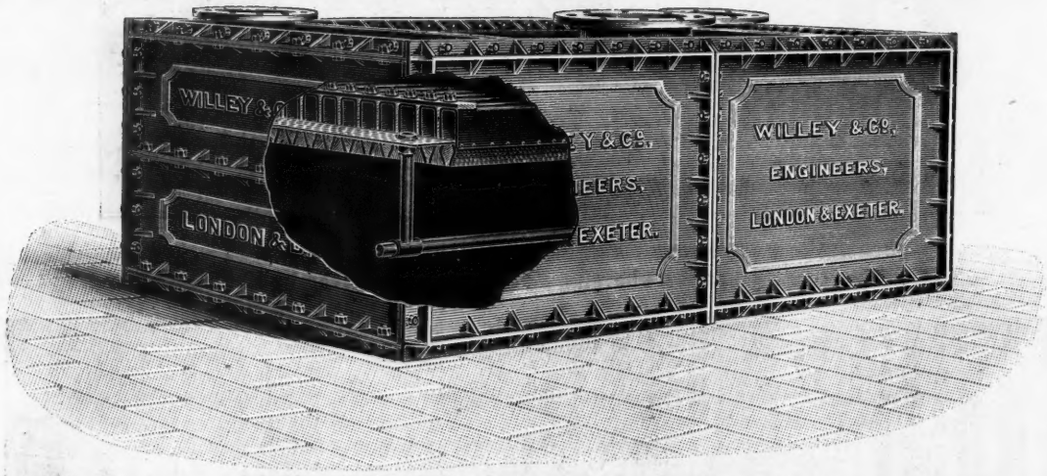
32A, Hertford Road, De Beauvoir Town, LONDON, N.; and James Street, EXETER.

OFFICES AND DEPOTS:

CARDIFF: Prudential Buildings, St. Mary Street.

MANCHESTER: Victoria Buildings.

PLYMOUTH, DEVONPORT, SWANSEA, & NEWPORT.



THE LIVESEY WASHER.

Manufacturers of

GASHOLDERS, PURIFIERS, WASHERS, and every description of Gas Plant.

Improved Gas Governors, Station Meters, Consumers' Meters, Gas Apparatus, and Gas-Fittings.

SPECIALITY.

Prepayment Meters for any coinage, unexcelled for Accuracy and Reliability.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

The Eagle Range & Gas-Stove Co., Limited,

AMALGAMATION OF

ARDEN HILL & CO., LTD., and The Eagle Range & Foundry Co., Ltd.

CONTRACTORS to H M. GOVERNMENT and the CROWN AGENTS for the COLONIES.

GAS-STOVE MANUFACTORY: ACME GAS-STOVE WORKS, SALFORD ST., ASTON, BIRMINGHAM.

RANGE MANUFACTORY: EAGLE WORKS, CATHERINE STREET, ASTON, BIRMINGHAM.

SHOW-ROOMS: 127, Regent Street, London, W.; 58, St. Paul's Churchyard, London, E.C.; 2, St. Augustine's Parade, Bristol; 65, Stretford Road, Manchester.

THE MASTER PATENT

"ACME"

GAS COOKERS

ARE SUPERSEDING ALL OTHERS.

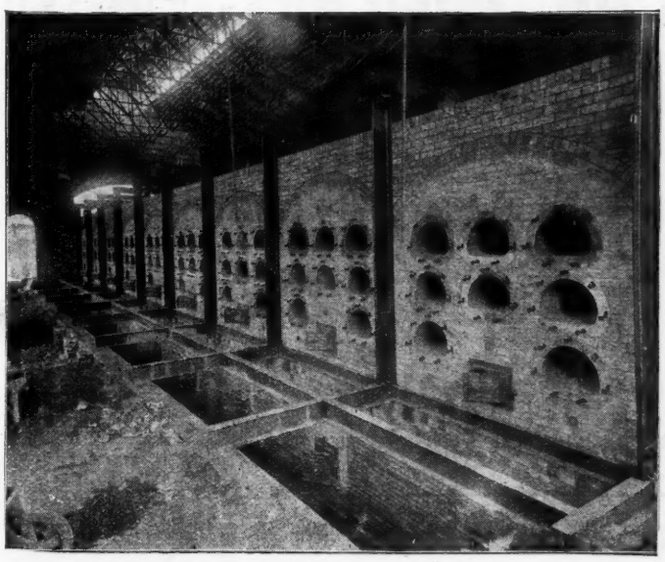
SAMPLE SENT ON APPLICATION.

THE LEEDS FIRE-CLAY CO., LD.,

ENGINEERING DEPARTMENT

Telegrams: "SETTINGS, LEEDS." Telephone: No. 612.

WORTLEY, LEEDS.



Engraved from a Photograph taken during the Construction of our Regenerator Settings.

RETORT-SETTINGS

OF EVERY DESCRIPTION

INCLINED, HORIZONTAL,

REGENERATOR, GENERATOR,

and DIRECT FIRED.

SHALLOW REGENERATORS

A SPECIALITY

MANY INSTALLATIONS.

EXCELLENT RESULTS OBTAINED.

RETORTS RE-SET.

RETORT IRONWORK.

COAL AND COKE-BREAKING AND CONVEYING MACHINERY.

BUILDINGS, ROOFS, &c.

KIRKHAM, HULETT, & CHANDLER, LTD.,
PATENT "STANDARD" WASHER-SCRUBBER

Extracts ALL the Ammonia and a large proportion of the Sulphuretted Hydrogen and Carbonic Acid.

Old Pattern Machines fitted with latest Improvements at small cost.

Inspection and Estimates on Application.

PATENT "STANDARD" WASHER-SCRUBBERS in use and in hand now number over

580

Address: 3 & 4, Palace Chambers, Bridge Street, Westminster, London, S.W.

AMERICAN GAS OIL

SOLE IMPORTERS—

ANGLO-AMERICAN OIL COMPANY, LIMITED,

This well-known quality of Oil is used at most of the Corporation Works and Companies' Works throughout the United Kingdom. Contracts have also been entered into with several of the large Railway Companies.

LARGE STOCKS. PROMPT DELIVERY.

Stock of about 30,000 Tons is usually carried by us at our Installations at Avonmouth, Birkenhead, Barrow, Manchester, and London.

HEAD OFFICE:

22, BILLITER STREET, LONDON, E.C.

ALEX. C. HUMPHREYS, M.E.
A. G. GLASGOW, M.E. } MM.Inst.C.E.

SINCE 1893

MESSRS. HUMPHREYS & GLASGOW

Have constructed or have in hand

CARBURETTED WATER-GAS PLANT

FOR THE FOLLOWING UNDERTAKINGS:—

American construction is instanced only when from the LONDON Designs of Messrs. Humphreys & Glasgow.

	Cub. Ft. Daily.		Cub. Ft. Daily.
Copenhagen	700,000	Commercial Gas Co.	850,000
Copenhagen (Second Contract)	2,500,000	Commercial (Second Contract)	850,000
Belfast	1,700,000	Commercial (Third Contract)	1,250,000
Belfast (Second Contract)	4,500,000	Croydon	1,250,000
Brussels	700,000	L. & N.W. Railway, Crewe	700,000
Brussels (Second Contract)	700,000	Taunton	225,000
Liverpool	3,500,000	Lawrence, Mass.	400,000
Liverpool (Second Contract)	4,500,000	Rotterdam	850,000
Tottenham	750,000	Dorking	125,000
Tottenham (Second Contract)	750,000	McKeesport, Pa.	500,000
Santiago de Cuba	400,000	The Gaslight and Coke Co., Bromley	3,750,000
Swansea	750,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Manchester	3,000,000	Durham	200,000
Brighton	1,750,000	New York (Remodelled)	11,000,000
Preston	1,500,000	Scarborough	800,000
New York	1,200,000	Perth, W.A.	125,000
Southport	750,000	Bremen	550,000
Bath	1,000,000	Maidenhead	225,000
Newburgh, N.Y.	350,000	Epsom	225,000
Newburgh, N.Y. (Second Contract)	250,000	North Middlesex	150,000
Hoylake	125,000	Wandsworth and Putney	1,800,000
Coventry	600,000	Aarhus	800,000
Coventry (Second Contract)	600,000	Falmouth	150,000
Bordentown, N.J.	125,000	Southampton	800,000
Winchester	200,000	Hartlepool	750,000
Shanghai	225,000	Utrecht	1,000,000
Stockport	500,000	Deventer	150,000
Norwich	1,000,000	Portsmouth	1,000,000
Holyoke, Mass.	600,000	Bournemouth	1,000,000
Lea Bridge	350,000	Aylesbury	150,000
Lea Bridge (Second Contract)	350,000	Hamburg	1,750,000
Stockton-on-Tees	500,000	Dublin	2,000,000
St. Joseph, Mo.	750,000	Redhill	275,000
Edinburgh	2,000,000	Stockport (Second Contract)	500,000
Guildford	350,000	Brighton (Second Contract)	1,750,000
Brentford	1,200,000	Croydon (Second Contract)	625,000
Bridlington	125,000	Maidenhead (Second Contract)	225,000
Syracuse, N.Y.	850,000	The Gaslight and Coke Co., Beckton	2,250,000
Middlesbrough	1,250,000	The Gaslight and Coke Co., Fulham	1,750,000

The 1891 Installations of The Gaslight and Coke Co., 12,000,000 Cubic Feet Daily.

IN THE UNITED STATES, TO DEC. 31, 1898,

Messrs. Humphreys & Glasgow and their Colleagues The United Gas Improvement Company have jointly constructed 293 Sets of Humphreys Double-Superheater Apparatus (excluding earlier extensive construction of Single Superheater and "Combined" Apparatus) with a daily capacity of 219,550,000 cubic feet. **Of this volume, 56,875,000 cubic feet daily were undertaken during 1898.**

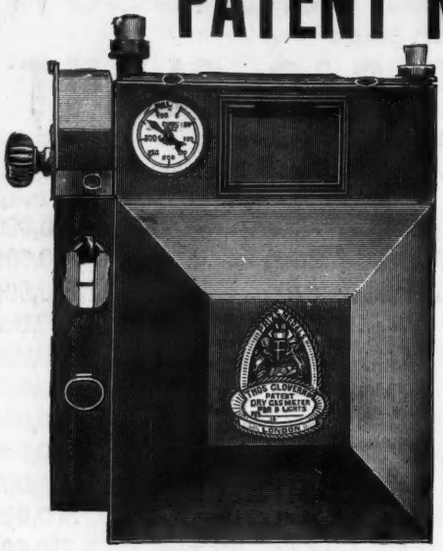
9, VICTORIA STREET, LONDON, S.W.

Telegrams: "EPISTOLARY, LONDON."

UNITED STATES OFFICE:

BANK OF COMMERCE BUILDING, NEW YORK.

THOMAS GLOVER & CO.'S
PATENT NEW IMPROVED
PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:
28, BATH STREET.	1, OOZELLS STREET.	37, BLACKFRIARS STREET.	ARGYLE WORKS, KINNING PARK.
Telegraphic Address: "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GOTHIC."	*Telegraphic Address:* "GASMAIN."
Telephone No. 1005.		Telephone No. 3.98.	Telephone No. 1525 South Side.

W. PARKINSON & CO.

W. PARKINSON & CO. have introduced this design of Station Meter in order to meet the demand for a more ornamental Tank. All joints are planed, the most modern improvements introduced, and the entire Meter is of the strongest and most substantial description.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegrams: "INDEX." Telephone No. 778 King's Cross.

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegrams: "GASMETERS." Telephone No. 1101.

CONTENTS.

EDITORIAL NOTES:—
GAS, LIGHTING, &c.— PAGE.
The Meeting of the South Metropolitan Gas Company—Portents and Changes . . . 413
North of Ireland Association Meeting . . . 414
Gas Workers' Strike in Paris . . . 414
Labour Disputes and the Study of Words . . . 415
Auditors . . . 415
WATER AND SANITARY AFFAIRS—
Some Features of the Past Session . . . 416
ESSAYS, COMMENTARIES, AND REVIEWS:—
Gas and Water Companies in the Stock Market . . . 417
Electric Lighting Memoranda . . . 417
Possible Use of Electric Power in Gas Manufacture . . . 418
Workmen's Compensation and Old-Age Pensions in France—I. Workmen's Compensation . . . 419
Sir Edward Frankland . . . 420
NOTES:—
Iron-Felt for Insulating Vibration . . . 421
The Philosophy of the Wiped Joint . . . 421
The Advance of Steam Heating . . . 421
Coke Breeze Concrete for Fireproof Floors . . . 421
The Fixation of Iridescent Films . . . 421
The Flash-Point as a Means of Research . . . 421
The Testing of Portland Cement for Soundness . . . 422
Scraping Water-Mains . . . 422
COMMUNICATED ARTICLE:—
"27·68." By Henry O'Connor, Assoc.M.Inst.C.E. . . . 422
TECHNICAL RECORD:—
North of Ireland Association of Gas Managers—Annual Meeting—General Business . . . 423
Inaugural Address of Mr. J. Auchterlonie . . . 423
Lecture by Professor Tichborne, LL.D., F.I.C. . . . 424
Mr. S. B. Langlands on Building Construction in Small Gas-Works . . . 425
Mr. W. A. Reid on the Working of a Semi-Regenerative Setting 427
REGISTER OF PATENTS:—
Heating and Ventilating Apparatus—Thompson, W. P. (American Incandescent Gas Company) . . . 429
Acetylene-Generators—Williams, R., and Clarke, J. H. . . . 429
Acetylene-Gas Producer—Varon, J. . . . 429
Gas-Meters—Rhodes, E. . . . 429
Prepayment Meters—Hawkyard, J., and Braddock, J. . . . 429
Illumination Photometer—Crawley, C. W. S. . . . 430
Hydraulic Mains of Inclined Gas-Retorts—Drake, J. A., and Marsland, J. S. . . . 430
Automatically Shutting Off the Supply of Gas to Premises in Case of Fire—Nobes, G. . . . 430
Coin-Freed Gas-Meters—Lake, H. H. (Schaffer, P. C.) . . . 430
Incandescent Mantles, Filaments, &c.—Boult, A. J. (A. M. Plaissetty) . . . 431
Manufacturing Calcic Carbide and Illuminating and Heating Gases—Eldridge, H., Clark, D. J., and Blum, A. A. . . . 432
Gas-Burners—Léry, J. B. de, and Armington, W. A. . . . 432
Incandescence Gas-Burners—Léry, J. B. de . . . 432
Incandescent Gas Lighting—Armington, C. F. . . . 432
Patent Notices . . . 432
CORRESPONDENCE:—
The Reduction of Sunday Labour in Gas-Works . . . 433
Enormous Consumption of Water . . . 433
PARLIAMENTARY INTELLIGENCE:—
House of Lords—Bills Royal Assented . . . 433
House of Commons—Local Authorities and Water Diviners . . 433
LEGAL INTELLIGENCE:—
High Court of Justice—Chancery Division—*In re* the De Mare Patent . . . 433
High Court of Justice—Queen's Bench Division—Crays Gas Company *v.* Bromley Gas Consumers' Company . . . 434
The Lanchester Gas-Engine Patent . . . 435
A Gas Manager Charged with Embezzlement . . . 435
MISCELLANEOUS:—
Meeting of the South Metropolitan Gas Company . . . 435
Croydon Commercial Gas Company—The Half-Yearly Report and Accounts . . . 438
Provincial Gas and Water Companies . . . 438
The London Gas Companies and a Lesson in the Creation of Boards . . . 440
Proposed Incandescent Gas Lighting in Lambeth . . . 440
Glasgow Gas Supply—The Past Year's Working . . . 440
The Stirling Gas Company's New Works . . . 441
Visit of the Gateshead Corporation to the Redheugh Gas-Works . 441
The Public Lighting Question at Newmarket—The Gas Company's Tender Accepted . . . 441
Electric Lighting Notes . . . 442
The Sheffield Corporation and the Derwent Water Scheme—Thanks to Alderman Gainsford . . . 442
Plymouth Corporation Water Supply—The "Fyshinge Feaste"—The Burrator Reservoir and the Drought . . . 443
Gas and Water Companies' Stock and Share List . . . 443
Notes from Scotland . . . 444
Current Sales of Gas Products . . . 446
Coal Trade Reports . . . 447
PARAGRAPHS:—
PERSONAL: Mr. F. Thorpe; Mr. F. W. Ordish; Mr. W. Bell; Mr. H. Lawton; Mr. J. W. Napier; Mr. W. Orme; Mr. S. Halstead; Mr. W. Terrey; Mr. L. S. M. Marsh; Mr. H. Sayer; Mr. G. H. Harrison; Mr. R. Robinson; Mr. J. A. Stoneham; Mr. H. W. Chisholm . . . 421
Manchester District Institution of Gas Engineers . . . 418
The Gas Undertakings Returns—Reproductive Municipal Undertakings in Scotland—New Coalfield in Lincolnshire . . . 420
Crystal Palace School of Practical Engineering . . . 422
A Correction—Gas-Workers' Wages at Bolton—Alteration of Gas Rates at Bolton . . . 433
The Dangers of Electric Light Conduits—The Price of Gas at Bury St. Edmunds . . . 435
Reductions in Price—The Costs of the Scunthorpe Gas and Water Bill—Serious Gas Explosion at Birmingham—Contemplated Removal of the "Refreshment" Lamp in Leicester Square—The Gas Supply of Athlone . . . 439
Sales of Shares—Suffocation by Gas . . . 447
A New Water Supply for Anglesey—Fatal Explosion at the Oil-Gas Works of the Lancashire and Yorkshire Railway Company—Bravery of a Gas Workman Rewarded—The Assessment of Water-Mains—Water Supply of Cape Town Suburbs . . . 448

EDITORIAL NOTES.

The Meeting of the South Metropolitan Gas Company—Portents and Changes.

THE meeting of the South Metropolitan Gas Company on Wednesday was signalized by several incidents of the first importance, proceeding from the particular circumstances of the Company and the general situation of the Metropolitan gas industry. The speech of the Chairman, Mr. George Livesey, was evidently delivered under a very strong sense of responsibility—first to the Company and its consumers, consequentially to the Gas Companies of London and the whole country. As a speaker observed, many things have conspired to bring the South Metropolitan Company into the honourable but arduous position of leader of the British Gas Companies. The place has been forced upon the Company; and the attendant responsibility, heavy as it is, is the price of this distinction. The gas consumers of London in particular naturally look up to an Administration which has managed to reduce the price of gas by 2d. per 1000 cubic feet at a time when the biggest London Company have put 2d. on to their already high price. The whole gas industry of London and the Provinces is anxious to know what the South Metropolitan Company mean to do about the report of the Powers of Charge Committee. The price of gas in London, and the report of the Committee, were the main topics to which Mr. Livesey addressed himself. Of these two matters, the former supplies the ground from which the latter is to be viewed. It makes all the difference in the world, in the result, whether the report is regarded by the Company who are selling the cheapest gas in London, or by that condemned for charging the highest price. The price, moreover, is the only thing the public think about in connection with gas. Hence the South Metropolitan lead in this essential is, for the public, the ruling consideration of the situation. This it is that gives Mr. Livesey and his colleagues the right to be heard with respect upon any proposed statutory revision of the London gas settlement. They have no excuses to make; and no explanations of their official conduct are demanded. A system which has enabled South London to be served with gas at 2s. 1d. per 1000 cubic feet—with a prospect of further reduction—is thereby justified. Equally, the Administration that has so realized the intention of Parliament can appear before the tribunal of public opinion and claim to instruct it.

Now a strong Committee of the House of Commons has recommended an alteration of the existing gas settlement, which, if carried out, will have the most serious and far-reaching effects. Up to the present year, those most competent to speak in the interest of the Statutory Gas Companies of the United Kingdom have maintained the principle of the permanence of the standard price under the sliding-scale. This principle has never been explicitly accepted by Parliament; but it has always been acted upon in practical legislation. Time and again Parliamentary Committees have been invited to declare the inviolability of the standard price; but they have always refrained from doing so—contenting themselves with dealing with every instance on its merits. This has been in complete accordance with constitutional usage, which avoids legislating on abstract principles. The expedient of the sliding-scale and auction clauses in gas legislation has, therefore, been resorted to as a means to an end. It has been open to abuse, like other human inventions; and the wisest gas politicians have always deprecated the grasping after too high a standard price, lest the whole system should be discredited. In the course of parliamentary practice, the sliding-scale has sometimes been modified with the intention of increasing the pressure upon some Company to effect large reductions of price. It has also been conceded that any and every fresh issue of share capital might have its own standard price. Still, up to the present year, standard prices once fixed have not been interfered with, notwithstanding the endeavours to this end of Local Authorities opposing Gas Companies' Bills. It has been tried against the South Metropolitan Company itself, but vainly.

The precedent of the Lea Bridge case of the late session has thrown the whole system into the melting-pot. Here a standard price was lowered. This is the great thing to be borne in mind; for, as Mr. Livesey says, if Parliament

begins altering standard prices for one excuse, it will be done for another. There is no finality to this course of action. For the moment, the last word of Parliament, by a Committee, on this subject is that there should be a revision of the sliding-scale of any Metropolitan Gas Company coming to Parliament for an extension or alteration of their capital powers. It is further advised that the revision should be of such a character that, in the particular case of the South Metropolitan Company, the shareholders would benefit rather than lose by the change. Consequently, it becomes a matter of serious consideration for the Directors of the Company whether they should not, in the interest of the Company, take the Committee at their word by depositing a Bill accepting the proposal. The Company, under the actual conditions, need not go to Parliament for more capital for a few years—never mind the probable number, which is immaterial to the argument. What are the prospects of their receiving a few years hence better treatment than if they went next year with the Committee's report in their hand? That is the question which, for the Company, overshadows all others.

Upon the definite recommendation of the Committee, that the old London Company's district south of the Thames should be transferred to the South Metropolitan Company, Mr. Livesey made an important statement. This was to the effect that while the South Metropolitan Board are quite ready and willing to negotiate for the transfer with the Horseferry Road, they will not submit the matter to arbitration. So far as the interest of the South Metropolitan undertaking in the area in question is concerned, it is more a question of sentiment than anything else. Naturally, the Company would like to get rid of this foreign territory in their midst, which has already given them some trouble, and makes a break in their distribution system. A bargain might be struck between the Companies either for the district alone, or for the district and the works. For the district, the purchasing Company could afford to pay a price calculated on its profit value to them at their ordinary selling rate for gas, quite irrespective of the consideration of whether or not the present owners are carrying on the business at a loss. For the works themselves—well, as we have already remarked, this would be a curious exercise in valuation, which we do not feel called upon to undertake. The South Metropolitan position in regard to this Nine Elms matter is that, while "willing to oblige," they will only do so on terms agreeable to the interests of their own stockholders; and the Board do not see that the advantages of taking over the district are worth arbitrating about. This view is quite consistent with the intention of the Powers of Charge Committee, who recommended the transfer wholly in the interest of the northern consumers of the Gaslight and Coke Company, and did not say that it would be of any particular advantage to the South Metropolitan Company.

Lastly, returning to the internal affairs of the South Metropolitan Company, the Chairman announced that the Board have taken a prudent step in co-operating with the Local Authorities of their district, with the laudable object of improving the public lighting arrangements. The street lamp-posts of London have long been a byword; but the difficulty in the way of their renewal has been the lack of public funds appropriate to the purpose. So it has come to pass that many London parishes have kept until now the original lamp-posts set up when George the Third was King. In South London, several of the parishes have done their best to improve the public lighting; but the ratepayers are too heavily burdened for other purposes to warrant additional expenditure for improved street-lamps. The incandescent system has come to their rescue, with an economy of gas which the South Metropolitan Company have capitalized in order to reform the street-lighting equipment. Thus the whole service is being improved and modernized without entailing any additional burden on the ratepayers. Incidentally, this strategic movement anticipates one of the most powerful inducements to parochial electric lighting "enterprise," which has usually been founded on the presumed necessity of improved public lighting—imagined, further, to be available only in the one form of arc lamps. In this respect, again, the South Metropolitan Board have simply been attending to their proper business, instead of posturing as a "*quasi*-Depart-" ment of State" with their heads in the clouds.

The mention of some disappointments in the working out of the Company's profit-sharing scheme was not unexpected. The subject was touched upon in the Directors' report. There is nothing at all peculiar to the South Metropolitan experience in the discovery that some of those work-people who take their share of the increased profit due to good working, are really parasites on the industry and devotion of others. It is not an extravagant supposition that the directorial cogitations on this matter were possibly brought to a point by the remarks on profit-sharing in our article on "The Remuneration of Labour," of the 1st inst. It was there expressed that one of the shortcomings of a profit-sharing system is that "it makes "the unworthy share the benefits procured by better "men." The South Metropolitan Board are resolved that this shall no longer be, in their scheme. We would merely suggest that if a man is not worthy to participate in the benefits of the arrangement, he can hardly be worth keeping on any terms at all. Two classes of workmen, divided by a moral rule, can scarcely be expected to work together in a free factory.

The meeting—to conclude this extended notice—was held under the shadow of the death of the late Chief Engineer, Mr. Frank Livesey, whose premature demise was much deplored. The promotion of Mr. C. C. Carpenter to the succession was well received; and the able and courteous Secretary, Mr. Frank Bush, was rewarded for his services by a most gratifying vote. Altogether, those who attended the meeting must have felt that it marked an era in the history of the Company, and perhaps in that of the national gas industry.

North of Ireland Association Meeting.

THE meeting of the North of Ireland Association of Gas Managers in Dublin last Tuesday was successful to a degree which gave some of the members and friends of the Association a sort of pleasant surprise. The programme was a heavier one than is usually to be met with at the meetings of the Association in the Sister Isle; and the subjects were appropriate. Profundity is not to be looked for from managers of gas-works producing, as many of them in Ireland do, less than (say) 10 million cubic feet of gas per annum. It is, therefore, wisdom on the part of the administration, while accepting papers from members upon topics which are within their range of observation—such as were the papers by Mr. Langlands and Mr. Reid—to arrange for a lecture containing information from a deeper vein than is accessible to the members generally. Upon the former the members are let loose in criticism—everyone having his own theory or experience upon which to dilate; in the case of the latter they can only sit and listen, with a view to learning. The arrangement is an excellent one for such an Association as that in Ireland; and it worked admirably last week. In Mr. R. B. Anderson's paper on differential rates for gas, the author essayed the difficult task of trying to prove that Mr. Newbigging's views as to the sale of gas were erroneous. At most, he could only establish that they were not applicable to small gas undertakings in Ireland; and his sole possible method of doing so was by putting forward his own experience. This he did; but the experiment is upon too limited a scale to be conclusive, and the probability is that it leaves all who had made up their minds upon the subject "of the "same opinion still." It is evident that the Association is changing its ground, literally. It is gradually creeping southwards; and the proposal—several times spoken of before, but always hitherto shelved—has taken concrete form in a notice of motion for changing the name to one which would embrace the whole of Ireland. The time seems ripe for such a step being taken. On one other point the Association are deserving of the highest congratulations in connection with their Dublin meeting; and that is the excellent excursion they provided on Wednesday. The enjoyment was both rich and plentiful. Surroundings of such a soul-satisfying nature as those which were passed through, are seldom to be met with.

Gas Workers' Strike in Paris.

THE intelligence that a gas workers' strike of considerable gravity has broken out in Paris is almost welcome as a reminder that the French can think of something else besides the Dreyfus "affaire." The strike began this day week with the firemen and stokers apparently of the Billancourt works; and next day the contagion of disaffection spread to other stations and grades of workmen. By Thursday, however, it was reported that many of the men had begun to think better of it, and were returning

to their duty. The most obstinate outstanders were the lamplighters, who held meetings and swore never to give in till their "just claims" had all been granted. Here, we can only refer to the handsome way in which, according to the published accounts of the Paris Gas Company, the employees of the Company have always been treated. We published our usual abstract of the accounts in the "JOURNAL" for May 2, when it appeared that there was a balance to the credit of the workmen's pension fund of £32,579. The savings fund amounted to £11,810; and the Company had been called upon to make good a large deficit on the provident fund. Altogether, the Company subsidized the various pension and provident funds to the amount of £78,216 for last year alone. This goes to show once more that mere "benevolence" will not suffice to make ordinary workmen contented and keep them so. The old idea that "a good master will have "good servants" is here exploded. To begin with, the servant declines to accept the master's judgment as to what is good or bad treatment. He wants to have his own say upon the matter; and it is not his fault if he does not do all the talking, set his own wages, and limit the functions of the master to the one duty of paying him.

We do not know at present what brought the Paris gas workers out into the streets. There was not an inkling of trouble in May. The men are in a Trade Union, of course —they call it a Gasmen's Syndicate—and the founder of the organization is a M. Brard, who is naturally a member of the Municipal Council. In France, as over here, Labour politics properly cultivated lead to municipal distinction. M. Brard presumably knows what the men have struck for; and he told the strikers at a recent meeting that the Municipal Council should "not vote the prolongation of "the monopoly of the Gas Company if it did not grant the "legitimate demands of the men on strike." Seeing that the Company's treaty has still several years yet to run, this encouragement is cold comfort to those who have left their employment; but it is exactly like the empty chatter that strikes are upheld by all the world over. The men drop the solid bone of their pay while the artful agitator is waving before them the simulacrum of fat meats to be "shared in the sweet bye-and-bye." Evidently, M. Brard has nothing to learn from our own strike manipulators, nor they from him; for he will no more than themselves be able to stave off the inevitable. The Company seem to be quite calm in face of the emergency. The gasholders happened to be high, either by good luck or good management; and when the firemen and stokers betook themselves to the rendezvous at the Bourse du Travail—good name for a meeting-place of men who had left their work! —all the rest of the working staff turned to and made gas for their lives. Again, this recalls our own experiences. The stoker gets what the Yankees call "swelled head" through the adulation of his paid sycophants, the Union officials, until he imagines himself indispensable. This was notoriously the case with the younger men who struck against the South Metropolitan Company in 1889. Because they had acquired the knack of shouldering the scoop smartly, they thought they had only to ask and have in the matter of wages. They were almost right; but they made a little mistake in claiming mastery as well as money, and that ruined them. Whatever may prove to be the cause of the Paris gas workers' revolt, we have to recognize the staunch way in which the Administration has stood up to the emergency, and kept the lights supplied.

Labour Disputes and the Study of Words.

IT begins to look as though the amiable intervention of the Editor of a London daily paper is after all hardly sufficient to impose peace upon the disturbed building trades. Trouble still exists in Yorkshire—notably in Leeds, Sheffield, Selby, York, and Hull. The unrest in Sheffield is not restricted to the building trades; and the state of affairs here has a rather ugly look, to those who remember the industrial history of the place. The tyranny of Trade Unionism is asserting itself again; and a local newspaper has lent itself to the demand that the Corporation work shall only be given to "fair" shops. Now it is very important that the language of Labour agitators and their Press flatterers should be closely scrutinized, because, like all incendiaries, they have a knack of applying common words in a special sense which the general public do not understand. They take possession of a perfectly honest and unobjectionable word, which does not alarm the general public, and they give it a particular application of their own. Then they twist the public use of the word in its common signification into acceptance of their meaning of it. More than this, they use innocent words and phrases to designate actions which they are afraid to call by their right names. Thus it is that the history of all revolts and revolutions supplies curious illustrations of the deceptive use of words. Too polite, or too cautious, to talk openly about "murder" or "pillage," the squeamish insurgent tribunals of the French Revolution merely ordered their victims "to the gate," and appropriated their property to the common good. In the same spirit, the Trade Union agitator calls a "fair house" the factory where he and his are the real rulers. Every other establishment is "unfair." It is not surprising that the careless public are sometimes entrapped by this artful misuse of words into sympathizing with those who practise it. Happily, words are the tokens of wise men, although they may be the money of fools. It is sometimes possible to repay the twisters of words in their own coin. A tremendous fuss has been made, for instance, from time to time about "picketing;" and the legal tribunals of the country have been greatly exercised over the legality or otherwise of the practice usually described by this word. Not long ago it was incidentally discovered that there is another way of describing all that is essential in the act of picketing—namely, "watching and besetting" premises for the purpose of, &c. This took picketing in flank. The disputes in the building trade of Hull have given occasion for a further proof of the legal fact that picketing by another name has a different odour in the Courts. Some Trade Union officials of the town learnt from Mr. Justice Stirling last week that "watching and besetting" is actionable. An injunction was granted to restrain the performance pending the trial. "What's in a name?" indeed! The answer is obvious.

Auditors.

As we have recently and repeatedly expressed our views as to the serious inadequacy of the usual system of auditing—and especially of the system considered sufficient by some Auditors elected by shareholders—we wish to record our satisfaction at the announcement made by the Governor at the recent general meeting of the Gaslight and Coke Company that the Auditors of the Company have now—in the exercise of the powers conferred upon them by the Companies Clauses Consolidation Act of 1845—obtained the services of an assistant, not, it is explained, in order to relieve them of any part of their duties, but for the purpose of rendering their audit more comprehensive. This announcement is welcomed, not because we think that the step taken will, even if imitated by the Auditors of all other Companies, at all necessarily remove the fundamental weakness which, we hold, renders the majority of audits, as at present conducted, little if any better than a farce, but because we regard it as a sign that the question of the view generally taken by Auditors of their responsibilities and duties (the seriousness of which question we have so constantly urged) is receiving attention at the hands of the Directors and Auditors of the great gas undertakings. We dare say some of our readers are inclined to think: "Why "all this to-do about auditing? Everyone knows that the "signature of the Auditors of a big Company stands for "little. Then why not let things be?" Our answer is that, unfortunately, it is only those who possess intimate knowledge of Auditors' methods who really do appreciate the fact that, as accounts are at present audited, any Accountant can, if he choose, hoodwink any Auditor; and that the importance of calling constant attention to the question arises from the fact that the ignorant section of the investing public believe that the Auditors' certificate on a balance-sheet is a guarantee that the balance-sheet accurately represents the financial position of the concern. As a matter of fact, the certificate most generally means no more than that the Auditors have ascertained that the statement of accounts corresponds with the books laid before them, for the accuracy of which the Auditors are content to implicitly accept the signatures of the officials of the Company.

To put a concrete case: The balance-sheet of the Gaslight and Coke Company for the 30th of June last shows an asset of £469,490 for stores in hand. By what process did the Auditors arrive at the conclusion that stores of this value were actually in stock? Could they vouch, from

their own personal examination, for the existence in the coal-stores of a shillingsworth of coal? Supposing the stores on hand were only, in fact, worth £300,000, where would the balance carried forward be? We do not, for one moment, suggest that the goods in stock were worth a single penny less than the value shown in the balance-sheet; but how did the Auditors satisfy themselves of the existence of the asset? Until the principle is recognized and adopted by Auditors, that their duty is to ascertain whether the books and accounts of any Company they serve are honestly and accurately kept throughout, and to ascertain that honesty and accuracy by means of an entirely independent examination—in the course of which no certificate for the correctness of any item is accepted from any official of the Company, high or low—we shall not attach very much value to the certificates appended to the published balance-sheets of joint-stock Companies of any magnitude.

WATER AND SANITARY AFFAIRS.

THE session which closed last Wednesday, although not marked by the passing of any drastic measures in connection with the Metropolitan Water Supply, which, at the opening of Parliament, it was hoped and believed in some quarters might be the case, was nevertheless a by no means uneventful one as far as regards those in whose hands this important public service remains. The "Gazette" notices in November had given an indication of the plan of campaign laid out by the London County Council and of the proposals of those of the London Water Companies who were compelled to seek further powers in respect of their particular undertakings. Then there was the collective application by the Companies for sanction to an intercommunication scheme, justified by the events of last summer, and approved by the Royal Commission. Next came the announcement in the Queen's Speech that this matter would be taken up by the Government in a Bill "for providing a more complete distribution of water supply "in cases of emergency," and the prompt following up of this intimation by the notice of the Bill given by the President of the Local Government Board. The two Companies who were in Parliament—the East London and West Middlesex—each required power to carry out additional works and draw more water from the Thames. Of course, both Bills were opposed by the London County Council—successfully in the former case, for the Bill was thrown out in the House of Lords after having gone safely through the Commons; and partially so in the latter, for the West Middlesex Company did not escape the imposition of the sinking-fund clause. The opposition to these measures has, we venture to think, been detrimental to the public interests; for the carrying out of important storage works has been prevented, and money which would have gone into the pockets of the consumers in the shape of a rebate on their bills will now go into those of the Chamberlain of London. In view of the announcement made by the Government, there was no need to proceed with the Companies' Intercommunication Bill, and it was withdrawn. Mr. Chaplin's measure eventually became law; and the fact was duly noticed in the Speech on the prorogation of Parliament last Wednesday. The Bill was not carried through, however, without a tussle with the usual opponents of everything likely to be advantageous to the Water Companies; but the beneficial effects of the system it has sanctioned are now being witnessed in the assistance which several of the Companies are able to render to the one standing in need of it. As for the four Bills promoted by the County Council, one did not comply with Standing Orders, and the other three had to be withdrawn. The net result of the work of the session, therefore, as far as the London Water Supply is concerned, is that, while authority has been denied for the execution of works that must have proved valuable, it has been granted for others which cannot fail to make the service more efficient.

As far as the Provinces are concerned, the most prominent feature of the past session was the contest between Derby, Leicester, and Sheffield for the waters of the Upper Derwent. This triangular duel, as our readers are aware, has resulted in an arrangement which appears to give satisfaction to all the parties concerned. It is to be regretted that this result could not have been attained by some amicable understanding being come to between the various Authorities interested before they appeared in Parliament, especially from the ratepayers' point of view; for, according to a statement by the Mayor of Rotherham, if they had only worked together there would have been a saving of £100,000 to £150,000 in expenses. However, Sheffield reckons to be a gainer to the extent of £35,000 per annum by securing a share of the Derwent water. But apart from the solution of a very troublesome problem, the contest is of interest from the fact that it brought out the enunciation of the principle that the rights of County Councils to appear before Parliament in connection with water questions should be recognized. The Council specially concerned with this matter was that of Nottinghamshire; and they are not only satisfied because a certain quantity of water—though only half of what they asked—has been allotted to them, but also because they have caused an important precedent to be set in regard to the position of counties in matters of water supply. All's well that ends well; and if all parties are contented with what they have secured, they will the less grudgingly pay the heavy bill of costs.

An important item in the parliamentary programme for the past session was the Bill promoted by the Stockport Corporation to enable them to acquire the undertaking of the Stockport Water Company. This measure successfully passed the Commons, notwithstanding opposition from neighbouring Local Authorities, which was renewed in the Lords, where the matter came before a Committee presided over by the Earl of Camperdown. His Lordship has lately distinguished himself by giving "surprise" decisions; and the amendments made by his Committee in the Stockport Bill at one time threatened its existence. To mention only one of them, the Bill as introduced provided that any net balance of profit should be carried to the district fund for the relief of the rates; whereas in the Act this balance is to be applied "in reduction of "the water-rates for domestic supply." Seeing that the former was the main object of the Corporation in acquiring the undertaking, it may well be supposed that the change made by Lord Camperdown was not regarded in the light of an amendment. In fact, it was acknowledged that one great merit of the undertaking was seriously diminished thereby. Another Bill promoted to sanction the transfer of water-works to a Local Authority—that of the Godalming Corporation—curiously enough encountered opposition from a section of the sellers, the Frith Hill, Godalming, and Farncombe Water Company, on the ground that the price offered was inadequate, and that the works should be sold on arbitration terms. But as no less an authority than Mr. J. Mansergh expressed the opinion that the price offered was fair to all parties, the Bill went through. This good fortune, however, did not await that of the Southampton Corporation, by which they endeavoured to acquire the portion of the South Hants Water Company's works lying within the borough; for, after undergoing the scrutiny of a Lords' Committee, the Bill was thrown out by the Commons. The Corporation have been singularly unsuccessful in their attempts to obtain possession of this undertaking, whether in whole or in part.

Those who are in the habit of watching the course of parliamentary proceedings generally look, as the end of the session approaches, for the operation commonly known as the "slaughter of the innocents." Year after year measures are brought in and read the first time, occupy a place on the "Votes," are promptly blocked, and eventually disappear, only to be resuscitated in the next session, with possibly a similar fate. Early in the present year, a Bill was introduced by Mr. Cornwallis, the member for Maidstone, to amend the law respecting the supply of water "by companies and other bodies and persons." In view of what had occurred in the town he represents, it was only natural that he should be desirous of having such changes made in the law as would protect sources of water and ensure purity of supply, not alone in Maidstone, but elsewhere. The operation of the Bill was, however, to be limited to England only; and the Administrative County of London and the area mentioned in section 3 of the Metropolis Water Act, 1847, were to be excluded. It was suggested that the proposed Act should come into force on the 1st of January next year; and if it had gone through, any Water Company guilty of supplying for domestic use impure or unwholesome water were to be liable to a penalty not exceeding £50 a day. No proceedings were to be

taken against them, however, without the authority of the Local Government Board. The Bill was read the first time early in the session; but it was very soon heavily blocked, and no further progress being made with it, a question was put to Mr. Chaplin, about the end of June, as to the possibility of getting it through this session, or the prospect of the Government bringing in a Bill constituting a County Council the Water Authority for their district, where they are not so already. But the right honourable gentleman was not to be led into making any promises. The Bill was withdrawn on the 25th ult.; and it now remains to be seen whether the Government, being already identified with the politics of water supply, will consider the question of the protection of sources one of sufficient importance to form an item in their programme for next session. It would seem that such a measure as the one under notice should emanate from a Government Department rather than from a private member.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 443.)

Business on the Stock Exchange last week was of a very quiet description as a general rule. There was a good deal of speculation going on in mining centres; but that is another story. The markets, taken altogether, had not recovered from the holiday interruption; and what with the hot weather, the commencing autumnal recess, and the protracted delay in getting at a solution of the Transvaal difficulty, business transactions were kept down to small proportions. Everything was flat, too; and prices all round were lower. Consols, be it noted, touched 105¼ on Thursday and Friday, though they were a shade better at the close. The Money Market was very firm; and a further advance in the Bank Rate—say, to 4 per cent.—is thought to be probable at no distant date. Business in the Gas Market was quite on a restricted scale. Movements in value were few and slight, and of no great interest; but the advances were more numerous and more important than the losses. In Gaslight issues, the ordinary opened well, and gave some promise of briskness; but dealings dwindled down to next to nothing. The prices, however, remained very firm, and buyers marked a point higher. The secured issues were less buoyant, but were unchanged. South Metropolitan was very little dealt in, but was strong—changing hands at 143, with an advance of a point in the quotation. The debenture had a similar advance. Commercials were almost unnoticed. There were only two or three transactions in the Suburban and Provincial group; and prices did not vary. The Continental Companies, too, were dead quiet; and the old quotations were left standing. Movements in the remoter undertakings were unimportant; but River Plate and San Paulo were a little easier. Business in the Water Companies was of the usual quiet nature. Prices generally were fairly good. Kent advanced.

The daily operations were: Upon the reopening on Tuesday, business was rather sluggish; but prices generally were very fair. South Metropolitan improved 1. On Wednesday, things fell into a state of extreme torpor; and quotations did not move. On Thursday, it was hard to detect any advance towards animation; and prices remained stationary. In Water, Kent improved 2. Friday, though fully as inactive, brought about some changes. Gaslight ordinary rose ⅛; but River Plate was ⅛ lower. Saturday was of the same character. South Metropolitan debenture advanced 1; but San Paulo receded ¼.

ELECTRIC LIGHTING MEMORANDA.

An Electricity Generation in Bulk Scheme for South Staffordshire—The Prospects—No Trade—Electric Lighting of the City of London.

An electrical contemporary announces, with the usual flourish, that electric power distribution on the grand scale is "just about to begin" in South Staffordshire. It is certainly high time; the enterprise having been talked of for at least four years. Now it is reported that an actual Company has taken the scheme in hand; the moving spirit being a financier connected with a well-known insulated cable firm. Competent electricians are to advise the new Company, and South Staffordshire is supposed to be all agog for the fresh power supply. We shall see. As our contemporary justly observes, South Staffordshire is practically "one huge town;" and it is considered that "the multitude of small and varied interests which will always be carried on, combined with the proximity of all raw materials, makes this area one of the most promising in Great Britain for the application of electric transmission of power. If the distribution of electrical energy from a steam-driven central station is to pay at all, then surely South Staffordshire is the place." This is very fairly put; and the country, which has heard so much about the advantages of electric power in the United States and elsewhere, will be thankful to the electricians if they really will make a start in the district, which appears to be so much of a Land of Promise for them. "Less talk, more work," ought to be the motto of the new Company. Somehow, we are not sanguine about the enterprise. It is doubtless of good augury, in a sense, that the cable interest has been enlisted for the new venture—that is, if this does not mean that the whole affair is merely a job for the cable people. A prominent electrician publicly remarked a little while ago that the cable manufacturers are the "silent swine" that eat up most of the electricity supply capital. While enthusiastic electricians are writing papers about dynamos, and multiphase currents, and the rest of it, the cable firms are saying nothing, but taking orders. All the electrical advancement of recent years has put money in the way of these quiet makers of insulated cables.

Assuming that the South Staffordshire Electric Power Distributing Company is to be a *bonâ fide* affair, inspired with the single motive of developing the business on its merits—a bold assumption, in the circumstances—what are the prospects? We incline to think the answer must be—poor. How or why is it that electric power distribution from a central station has hung-fire in this country? The only possible reply is that it is too expensive. If electric power were all the specialists' fancy paints it, it should have made its mark long ago on the London Hydraulic Power Company. It has scarcely touched this undertaking, the Engineer of which (Mr. Ellington) states that he is not afraid of the competition, because he can show a better duty for the coal consumed than the electricians can exhibit. True, the needs of the South Staffordshire region are not the same as those of the Metropolitan and other town districts chosen for the operation of central station hydraulic power. Mr. Ellington has left South Staffordshire open to the electricians, and would probably say they are welcome to it; the distances being too great for the economical distribution of hydraulic power, not to mention the unsuitable class of business. It is, to say the least, doubtful if electric power will answer commercially, although physically it is more suitable to the locality than hydraulic power. It will be a long and weary task to persuade the power users of the region that it will pay them to buy electrical power, even at 1d. per unit, instead of continuing to use their own steam-engines and boilers. One cannot forget the Birmingham Compressed Air Power *fiasco*. That venture failed because of lack of patronage.

The South Staffordshire electric power scheme comes between the hammer and the anvil—to use a metaphor suggested by the leading industry of the district. If it cannot attract the custom of the big power users, who have ranges of boilers burning cheap coal, it will have even greater difficulty with the users of small power units, who have the gas-engine and cheap gas. Mr. Swinburne admits that "if gas costs (say) 2s. per 1000 cubic feet, and electrical energy 4d. [per unit], the cost of electrical energy comes out about six times that of gas." All over South Staffordshire, this is the average price of gas supplied to engines, if it is not less. We can therefore see where electricity must be to stand a chance beside gas. We do not know at what price per unit the electricity generated in bulk in South Staffordshire is to be sold; but it can hardly be at less than 1½d. per unit. Even so, the market will have to be made. It must be remembered that there is very little "fancy" attraction in electric power, especially in a Black Country. The fashion of electric lighting has been greatly favoured by the existence of this kind of attraction. Indeed, it may be said with truth that a good deal of the vogue of electric lighting is due to fancy, for which people will always pay more or less handsomely. But power is power; and those who need it are not in the smallest degree influenced by fanciful notions in preferring one source of power to another. We do not say that the South Staffordshire electricity power scheme will never come to anything; but only that it inspires more curiosity than confidence.

The question of the electricity supply of the City of London is entering upon a fresh chapter. There was a rapid fall of the City of London Company's shares, consequent upon the passing of the interim dividend; but the property has since steadied, on the conviction spreading that this was the most prudent course for the Directors to take in the circumstances. Still, the price does not rise beyond 12½ for the Company's £10 shares, owing, it is said, to there being plenty of sellers willing to get out at about this figure. Meanwhile, Charing Cross shares have not recovered the value they possessed before the passing of the competing Order; and "the market is very curious to know how the money will be raised for bringing the Company into the City." That is, indeed, the point for consideration at present. The investment market is pretty well assured that the million of money, or thereabouts, which the Charing Cross Company have engaged to spend upon the new City branch, cannot pay a dividend immediately. The Company have no surplus capital powers of their own, and must therefore raise every penny of the money needed for their City extension. This will be done somehow; but the suggestion of there being any difficulty in the operation almost justifies the early financial experiments that culminated in the flotation of the City Company. During the past week, some correspondence on the situation has appeared in the London newspapers; and, as we imagined, the rate-cutting by the City of London Company is not only denounced as "cutting off the nose to spite the face," but is ridiculed as an effort to check the progress eastward of the Charing Cross Company. For good or evil, this competition will now run its course. The Company in possession are doing in a panic more than would probably have satisfied the public if done earlier.

POSSIBLE USE OF ELECTRIC POWER IN GAS MANUFACTURE

At the present time, there is an active propagandism afoot in the interest of various applications of electrical power. This observation is not strikingly novel; but it is sometimes necessary to re-state the obvious, lest it should be overlooked. The whole industry of gas supply is concerned in the watch upon electrical power developments, which are incessantly breaking out in some fresh place. Last year, for example, electricity generation and supply "in bulk" schemes were all the rage. The fact that not one of these projects survived the arduous parliamentary passage, is no guarantee that twice the number may not crop up again next November. During this holiday season, many clever gentlemen whose brains cannot be idle, are travelling over the country, bent upon combining business with pleasure. The result may be more Bills for pit-head and water-power utilization schemes. One thing is to be remembered for comfort in this connection. This year's slaughter of so many artless electricity "in bulk" projects, which could not justify themselves on the ground of expediency, will make future adventurers wary. It will be more difficult to raise money for preliminary expenses, after the severe treatment meted out to the Highland Water Power and other "wild-cat" proposals of the past session. We have all along contended that no grandiose plan of the kind had a ghost of a chance in Parliament, unless its economic advantage could be established beyond dispute. The whole grouping of British local government, local claims upon natural facilities, local manufacturing interests, is against such schemes. The vague aspirations for a British analogue to the Niagara power installation, are vanity in comparison with the solid strength of the interests with which any venture of the kind must conflict. Not that Parliament will stand in the way of any real economic advance. This has been made abundantly manifest. Only there must be no lack of proof of merit; and this has been the trouble. It is a remarkable thing, one may say in parenthesis, that so many respectable names were to be had in support of the power-in-bulk scheme already mentioned, when one of the chief witnesses called in support of the Bill had to admit that the proposed capital outlay would be altogether inadequate for the purpose intended. This is a weakness that should not have lain unsuspected so long; and the record will go heavily against all future proposals of the same or a similar nature.

As regards another aspect of electrical power enterprise—that directed towards the working of tramways—we have had previous occasion to admit that the country is probably on the verge of a great expansion of mechanical engineering activity in this respect. The country would long ago have been covered with electrical tramways, but for the hesitation of the administrations to embark upon confessedly imperfect systems. The tramway proprietors—that is to say, the municipalities—have been, and are still, waiting for improvements that do not materialize rapidly. All over the country, especially where the tramways are laid in pleasant places, good taste revolts against the overhead trolley wire; yet, one after another, the local authorities are yielding to it as the only available agent for procuring that rapid mechanical traction which is a growing need of the age. The reluctance of the authorities is being undermined by the irresistible argument that the trolley wire is only an accident, which can be modified or replaced by something better at any time; whereas the power station and all the other parts of an electrically-worked tramway are permanent and essential elements which should be provided without delay. At any rate, the fact remains that quickened road travel is the order of the day. Every rattling, barking "automobile" that bumps over the highway is an advertisement of the electric tramcar. It goes faster than a horse; and that is the attraction.

There is another branch of electric power application which possesses the closest interest for the gas industry. It is discussed in the current number of the "Engineering Magazine" by Mr. James Swinburne, under the title "Short Distance Electric Power Distribution," and is concerned with the utilization of electric power in workshops, mills, and so forth. It is precisely in this field that the electric motor jostles the gas-engine. As Mr. Swinburne points out, with his habitual acuteness, the equipment of workshops makes little noise in the world. The engineers in charge do the work, and look after the results. They do not want any consulting engineer to advise them; and there is no opening for self-advertisement over the job—"the machinery is merely put in and set to work." This modesty of achievement has its drawbacks, inasmuch as most "millwrights," or managers of engineering works, do not have their attention called to electric motors. It is not that electric driving is not considered good enough—it is not considered at all in many cases.

Mr. Swinburne, after his manner, is very sarcastic on the subject of the usual British way of serving power machines scattered over a chemical works or iron yard. "You find a pipe supported on infrequent poles . . . . you know it is meant to be a steam-pipe because there is warm water leaking from all the joints, and that it is not lagged because it was considered that enough internal warmth would get along the inside to prevent freezing. If you trace this pipe out, you will find that it goes to a punching bear or shears, which are rattled around by a steam and warm-water engine, which leaks too much for the water to blow its cylinder ends off." As to hydraulic power, Mr. Swinburne remarks that it possesses a great advantage when the work to be done consists of moving something a short distance against a great force, as in pressing, riveting, and the like. For hoisting, electricity is much more convenient. Steam-cranes are probably, as a rule, shockingly wasteful machines. Electricity is infinitely better, where facilities exist for a central generating station. As compared with hydraulics, the advantages of electricity are not so marked. The great drawback of the hydraulic system is its inefficiency. The ram has always the maximum pressure behind it, ready and willing to do its utmost. But this maximum duty is not always laid upon it, Yet every stroke of the ram spends the same amount of energy, whether it has any work to do or not. "This extra energy goes into the water; and the inefficiency of the hydraulic system is easily gathered from the temperature of its water. As already remarked, the hydraulic system is best for slow thrusts; but when the mechanism involves gearing up, the electric motor naturally comes in even if it has to gear down. It is more efficient to gear down than up. A hydraulic capstan, for instance, is a monstrosity."

There is, however, a debateable land. Mr. Swinburne admits that "the gas-engine is a lively competitor of the motor when the power is supplied by a central station." If gas costs, say, 2s. per 1000 cubic feet, and electric energy 4d. (per unit), the cost of electrical energy comes out about six times that of gas." This is a most significant concession. "The difference is so great that in many cases the gas-engine is better than the electric motor, though it has a varying load, and takes nearly the full amount of gas always, and though it needs more attention and costs more to begin with. The real reason is that the price paid for electrical energy from the central station is enormously high. . . . In cases where the power is supplied by the consumer himself, it comes out so much cheaper that gas power cannot compete with it at all." Mr. Swinburne probably means to say that home-made electricity is cheaper than bought gas; but the two sources of energy are not then on the same footing. He knows very well that nobody keeps full accounts of the cost of a home-made product, whereas when it is bought outside everything has to be paid for.

Mr. Swinburne admits, frankly enough, that "motor driving from public central stations is hardly developed yet." Nor is it very likely to grow into a big business at current prices. The gas-engine for town factories will take a lot of beating. Yet, while conceding that the electric motor has no prospects in the circumstances, Mr. Swinburne indulges in a diatribe against the "rampant socialism" in municipal councils which operates as an obstacle to the electrical generation in bulk schemes already alluded to. This is scarcely logical. Coming back to the point, the author finds that electric driving has special advantages for cotton mills and machine tools. These are: The absence of noise; the disappearance of overhead shafting and belts; and the lightening of loads on the foundations. Up to now, the electric motor has not had a fair chance. It is bought as a complete mechanism from some electrical works; and the machinist sticks it on to the tool where he can, under protest. This is both a costly and an unsatisfactory way of going to work. An electric motor is an expensive article; but much of the cost is for framework and bearings, which might easily be saved if the motor and the tool were properly designed as a combination. Besides, if the combination were self-contained, there would be much less holding down required. "A self-contained machine runs better the less it is fastened down; or to take Mr. Beaumont's motto: 'If the mechanism wants to wobble, let it wobble.'" The strain on all the parts of an unbalanced machine is lessened if the framework is not fixed to any foundations.

All this, as the French say, "gives to think." Seeing how amiably the electricians have taken to gas power as a means of making electricity, it would only be a graceful return compliment to adapt electrical power to the making of gas—say, as a motive power for stoking machinery. Mr. Swinburne declares that "there is no doubt that all tools can be best driven by motors." Retort drawing and charging machines are tools, so that the dictum may be understood to apply to them without stretching. We shall be curious to see who is the first engineer in this important field. Mr. Swinburne utters a not-superfluous caution to those who entertain an excessive confidence in the efficiency of electrical machines. He remarks that the efficiency of the small electro-motor is not likely to exceed 59 per cent. Even so, it compares favourably with compressed air and hydraulic power machines as applied to the working of gas-retorts. The only other question of difficulty is the choice between direct current and the polyphase system. This difficulty, however, is not insuperable. After all is said, it appears that there is a good *primâ facie* case for at least the consideration of the merits of electric driving for much of the machinery of gas-works; and the conjunction of the power and its purpose is sufficiently piquant to attract the attention of those concerned. There are enough smart young engineers with a knowledge of electricity employed in British gas-works to warrant the expectation that a study of the new mechanical problem would not be fruitless.

Manchester District Institution of Gas Engineers.—We are asked by the Secretary of the Institution (Mr. S. S. Mellor, of Northwich) to notify that the Committee have decided that the next quarterly meeting shall be held at Blackpool, on Saturday, the 9th prox., instead of the last Saturday of this month.

WORKMEN'S COMPENSATION AND OLD-AGE PENSIONS IN FRANCE.

I.—Workmen's Compensation.

Nothing has been more remarkable in the history of Social Reform in Modern Europe than the rapidity with which the majority of the civilized nations have recognized and adopted the principle that compensation for injuries accidentally sustained by the workers in any industry should be of an adequate character, and should be deemed to be as much an item in the cost of production to be borne by the employer as loss by fire, boiler explosion, or other accident to plant or machinery, and that such compensation should be made obligatory upon the employer. Our own Employers' Liability Act of 1881 cannot be said to have recognized this principle; the only liability thereby imposed upon employers being to compensate their workmen if injured through the fault or neglect of the employers or their agents. The series of enactments which have established the principle of making compensation for practically all accidental injuries to workmen a charge upon the industry in the pursuit of which they are incurred, may therefore be said to have begun with the compulsory insurance law which came into operation in Germany in 1883, and has since included measures (more or less fully embodying that principle) which have been adopted by Austria, Norway, the United Kingdom, France, and, last of all, Italy. The original and subsequent amending and elaborating insurance laws of Germany have been frequently explained and discussed; Austria has followed much on the lines of the German system; the provisions of our own Compensation Act are quite familiar to our readers; while Italy may be said to have adopted German principles and English methods. We propose now to give an outline of the French Workmen's Compensation Act (*Loi concernant les Responsabilités des Accidents dont les Ouvriers sont Victimes dans leur Travail: 9 Avril*, 1898), of the provisions of which a full account by Mr. W. F. Willoughby is given, together with the text of the Act, in a recent number of the "Quarterly Journal of Economics," published for the Harvard University.

The writer prefaces his account of the provisions of the Act by an interesting historical sketch of the phases through which the agitation for reform in the matter of the law of employers' liability in France passed before a settlement was reached. Until the enactment of the measure of 1898, the law regulating such liability remained that which was embodied in the Code Napoleon of 1804 (Articles 1382-4). This, in essence, much resembled the English Employers' Liability Act, the onus of proof (of the employer's negligence) being thrown on the injured employee or his representative. The agitation for reform at first sought merely to change the law so that the employer should be presumed to be responsible for all accidents unless he could prove that he had taken all needful precautions and was in no way to blame. But it was quickly seen that this proposed amendment of the law would only touch the fringe of the question, as, wide attention having been called to the subject by the system of insurance instituted in Germany, and statistics having been collected, it was found that only some 12 per cent. of accidents came under the then existing law. Attention was therefore centred on the question of making the industry bear, as a trade risk (*risque professionnee*), the cost of all accidents arising out of its pursuit. This principle of trade risk was accepted by the Chamber of Deputies in 1888; but the Bill passed by the Chamber was not ratified by the Senate. The main point of disagreement was the question whether workmen should be compensated for accidents due to *faute lourde*—that is, gross negligence—of the victim; the Chamber favouring, and the Senate opposing, the granting of compensation in such cases. This difference prevented any legislation on the subject for ten years; the Chamber of Deputies finally accepting a compromise in the Bill which became the present law. In this delay of legislation through disagreement between the two branches of the Legislature, the history of the question in France resembles that in our own country. A further subject of contention between the two Houses was as to whether employers should or should not be compelled to insure against the liability sought to be imposed upon them. The former alternative temporarily (but not finally) prevailed; and the Government, in 1893, introduced a measure providing for an elaborate system of compulsory insurance, which passed the Chamber by an almost unanimous vote, but was rejected by the Senate, and the deadlock continued. The passing of the English Compensation Act, however, again brought the subject into prominence; and the two Houses, by mutual concessions, finally agreed upon a measure which became the Act of April 9, 1898.

This Act, like the English one, is limited to specified industries, including the building trade, all factory, workshop, and workyard work, transportation by land or water, the work of loading or unloading, work at public storehouses, mines, and quarries, and any industrial work in which explosives are employed or manufactured, or in which use is made of machinery actuated by other than human or animal labour. This list, it will be observed, is somewhat more comprehensive than that contained in the English Act. The French law lays down, as its main principle, that an employer shall compensate any workman who, by reason of an accident received in the course of his employment and not brought about deliberately, shall be incapacitated for more than four days, or the heirs of any workman killed in such an accident, according to the following scale:—

1.—In case of temporary incapacity, an allowance equal to one-half the wages the victim was receiving when injured, beginning with the fifth day of incapacity. (This provision is considerably more generous than that of the English law, which excludes all injuries of shorter duration than a fortnight. The obviating of the necessity of ascertaining the average wages for a twelvemonth is certainly an improvement upon the English schedule.)

2.—In case of partial but permanent incapacity, an allowance equal to one-half the loss of wages involved in the partial disablement. (This does not strike one as being always easy to determine.)

3.—In case of permanent total disablement, an annual allowance equal to two-thirds of the yearly wages formerly earned.

4.—In case of death, compensation is to be made to the dependents of the deceased in the form of pensions, varying from a maximum of 60 per cent. down to 10 per cent. of the deceased's wages, according to the number and relationship of the dependents.

In the case of workmen in receipt of over 2400 frs. per annum (say, 37s. 6d. per week), the foregoing schedule only applies to that sum; the rate of benefits in respect of the remaining balance of wages being at one-fourth of the schedule rates.

In respect of all these allowances, however, it is provided that if it be shown that the accident occurred through an inexcusable fault on the part of the workman, the allowance shall be diminished; or if through the inexcusable fault or negligence of the employer, the allowance shall be increased. Some allowance is, however, to be made in every case. All the allowances are non-transferable, and exempt from attachment for debt. In addition to the allowances set forth, the employer is required to defray all medical and funeral expenses; the latter not to exceed 100 frs.

The most striking difference between the French and the English schedules is the provision made in the former for granting pensions, in place of the English plan of making payment of lump sums to the representatives of a workman accidentally killed; the pensions representing, moreover, if capitalized, a larger sum than that for which an English employer would be liable. The mutual scheme substituted by the South Metropolitan Gas Company for the obligations of the Workman's Compensation Act, practically adopted—or rather we should say anticipated—this French method of compensating for fatal injuries. We cannot but think that the receipt of a pension would be, in most cases, more really beneficial to the widow or orphans than the sudden coming into possession of, to them, a very large sum of money. An excellent arrangement, whereby the respective advantages of both systems are secured, is made in the French Act, by means of which the recipient of a pension may claim to have paid down the capitalized value of one-fourth of such pension, which is, of course, correspondingly reduced. The effect of this arrangement is to enable the recipient to buy a small business (or the proverbial mangle), without giving him or her the opportunity of squandering the whole of the compensation.

A provision is made whereby the employer may relieve himself of liability for such accidents as do not cause incapacity beyond three months by subscribing to Mutual Aid Societies approved by the Government. In the case of pensions, the employer may—if he for any reason goes out of business, he is compelled to—compound for his liability by paying the estimated capital value to the *Caisse Nationale des Retraites pour la Vieillesse* (of which we shall have some information to give later on); and the pension is then paid by that institution. A most important clause is that by which the payment of all pensions is guaranteed by the State; it being provided that if the employer, or the company in which he is insured, fails to pay any pension granted under the Act, such pension shall be paid by the *Caisse Nationale des Retraites pour la Vieillesse*, out of a guarantee fund to be derived from the proceeds of a special tax upon manufacturers and employers levied in the form of an increase of 4 c. in the *impôt des patentes*, and of a tax of 5 c. per hectare of land conceded for mining purposes. Right is reserved to the *Caisse Nationale* to proceed against the defaulting employer or insurance company. It is also provided that all companies and associations undertaking insurance against the liabilities imposed by the Act shall be subject to Government control, and may be required to maintain such reserve funds as may be deemed necessary. The employer is required, under penalty, to report to the Mayor of the Commune all accidents incapacitating a workman for 48 hours. In the case of death or probable permanent disablement, an inquiry into all the circumstances of the accident is required to be held at once by the Justice of the Peace for the canton, by whom all disputes as to allowances, &c., in cases of temporary incapacity are to be settled. In respect of other allowances, an action at law, with right of appeal, can be taken, unless settled by agreement before the President of the Civil Tribunal of the Arrondissement—an arrangement very similar to our arbitration by the Judge of a County Court.

It will be seen that, in principle, the French Act follows the

lines of English rather than of German legislation; the principle of compulsory insurance embodied in the latter being absent, as is also, however, the excellent plan of substituting an equivalent mutual scheme for the provisions of the Act, provided in our own law.

(To be continued.)

SIR EDWARD FRANKLAND.

It is with sincere regret that we record the death of Sir Edward Frankland, which took place last Wednesday in Norway, where he was spending a holiday. The sad event removes one of the most distinguished chemists of the century, and deprives a Government Department of an official in whose hands had been placed a highly important branch of its work.

Sir Edward Frankland was born at Churchtown, near Lancaster, on Jan. 18, 1825, and was educated at the Grammar School there, whence he proceeded to the Museum of Practical Geology, where he continued his studies under Dr. Lyon Playfair. Then he went to the Continent, and in the laboratories of Bunsen and Liebig, and in company with John Tyndall, at the Universities of Marburg and Giessen he completed his successful academical career; the University of Marburg conferring upon him the degree of Ph.D. for his dissertation upon the discovery of a method for isolating ethyl. On returning to England, he devoted himself specially to some important investigations in a new field of organic chemistry, publishing his first paper on the subject in the "Journal of the Chemical Society;" and in 1851 he was appointed Professor of Chemistry in the then recently-founded Owens College, Manchester (now the Victoria University). He filled that position for six years, when he was elected to the Professorship of Chemistry at St. Bartholomew's Hospital; continuing his researches into the new series of organic bodies containing metals, for which the Royal Society awarded him in 1865 the Royal Medal—the Council having two years previously elected him a Fellow. In 1863 he resigned his Chair at St. Bartholomew's upon his appointment as Professor of Chemistry at the Royal Institution of Great Britain in succession to Faraday; and, after filling this position for two years only, he again resigned—this time to take up the more important post of Professor at the Royal College of Chemistry. Here for twenty years he carried on his life-work; retiring in 1885.

In applied chemistry, Sir Edward Frankland's first work was begun in Manchester; and, strangely enough, it related to the manufacture of water gas. He also investigated the chemical composition of the gases evolved from different kinds of gas coal; and incidentally he invented a double-chimney argand burner, which, as our readers may remember, has recently been brought forward as a novelty. But his most important contributions to applied chemistry had reference to water supply and sewage questions. When in 1865 he succeeded Dr. Hofmann as Professor of Chemistry at the Royal College of Chemistry, he undertook to continue the monthly analyses of the water supplied to the Metropolis which his predecessor had recently instituted for the Registrar-General. These analyses he continuously performed; and his comments and reports form a most interesting and valuable feature of the Registrar-General's Returns, from which, for many years, they were reproduced in our columns. This serious task involved the elaboration of a new method of analysis, since the processes then known were imperfect and untrustworthy, especially for the detection of pollution by sewage or animal matters; and it was only after two years of laborious experiments, in which he was assisted by his then pupil, Professor H. E. Armstrong, that he succeeded in devising means with the accuracy of which he was satisfied. In 1868 he was appointed a member of the second Royal Commission on the Pollution of Rivers; and the Government provided him with a splendidly equipped laboratory in which to carry out the inquiries necessary for the purposes of that body. These researches occupied six years; and that they were on a most elaborate and exhaustive scale is sufficiently shown by the long list of subjects investigated. Among these were the chemical qualities of water from various geological strata and from different sources of supply; the possibility of rendering water once polluted again wholesome; the propagation of disease by drinking water; the influence of hard water on health; the deterioration of water in mains and service-pipes; and the quality of London water taken from the Thames. Of the last he did not, as our columns testify, at that time approve, because he held the belief that, no matter how satisfactory might be the chemical purification of polluted water by domestic or other artificial filtration, there was evidence that such water was still capable of propagating epidemic diseases. But this opinion was profoundly modified in the course of time, as filtration became better understood and more effectively applied. When lecturing before the Royal Institution in 1896, he declared unequivocally in favour of the Thames as the source of water supply for London; and, after emphasizing the astounding effect of sand filtration, as practised by the London Water Companies, upon the living matter contained in raw river water, he said that, with the provision of the storage reservoirs recommended by Lord Balfour's Commission, London would possess an ample water supply, unsurpassed for palatability, wholesomeness, and general excellence. The purification of sewage and the means of preventing the pollution of rivers by trade refuse, &c., were among the other matters he investigated in connection with the Commission.

In company with his friend Tyndall, Sir Edward Frankland, just forty years ago, spent a night on the top of Mont Blanc. The circumstance was not in itself, perhaps, specially noteworthy, as both were lovers of the Alps, but it led to the institution of a long series of investigations in physical chemistry. When upon the summit of the mountain, the rate of combustion of stearin candles was observed, with the object of discovering whether the rate of burning of bodies needing a supporter of combustion is independent of the density of the atmosphere in which they are burnt—a question which was answered in the affirmative. But Sir Edward Frankland noticed that the candles gave a very feeble light; and this observation caused him, upon his return to England, to commence a series of experiments on the source of light in luminous flames. The results were laid before the Royal Institution in a lecture "On some Phenomena attending Combustion in Rarefied Air," delivered on Friday, March 8, 1861, and published in the "Journal" the following Tuesday. The conclusion arrived at was that light is not always due to solid particles, since many luminous flames have none; and that incandescent gases and vapours emit light in proportion to their density. The lecturer apologized to his audience for bringing what he characterized as an "exceedingly simple subject" under their notice; and his excuse was the strong faith he had in the interest felt by the members in any scientific fact, however insignificant. We have since come to see that, on the contrary, the fact was of great importance. In 1863, Sir Edward once more stood before a Royal Institution audience as a lecturer on the subject of "Artificial Illumination," which was reported in the "Journal" for the 24th of February in that year. He was an occasional contributor to our columns; articles by him on "The Igniting Point of Coal Gas" and on "Magnetism" appearing as long ago as May 20, 1862, and Feb. 21, 1865, respectively.

Sir Edward Frankland was the author of several works on chemistry and water analysis. Foremost among them stands his "Experimental Researches in Pure, Applied, and Physical Chemistry," published in 1877, and dedicated to his "friend and teacher" Bunsen, as a testimony of his regard, and in gratitude for teaching which he acknowledged had imbued him with "the necessity for thoroughness and accuracy in all scientific work." Other works are his "Lecture-Notes for Chemical Students," "How to Teach Chemistry," "Water Analysis for Sanitary Purposes;" and, in addition to his monthly reports, already mentioned, there are his invaluable annual reports to the Local Government Board on the chemical and bacteriological condition of the London Water Supply, the first publication of which commenced in 1865.

In addition to the appointments mentioned above, Sir Edward Frankland, who was Foreign Secretary of the Royal Society, was made a corresponding member of the French Academy of Sciences in 1866. He was also a foreign member of the Academies of Sciences of Bavaria, Berlin, St. Petersburg, Upsala, America, and Bohemia. Oxford conferred upon him the degree of D.C.L. in 1873, and Edinburgh that of LL.D. in 1884. He was the first President, in the year 1877, of the Institute of Chemistry; and he occupied a similar position in the Chemical Society in 1871—being one of the six ex-Presidents entertained at the recent banquet. He was in the Commission of Peace for Surrey (his residence being The Yews, Reigate), and was a Magistrate of London. The honour of K.C.B. was bestowed on him in 1897, on the occasion of Her Majesty's Diamond Jubilee. Sir Edward was twice married; Professor Percy F. Frankland, of the Mason University College, Birmingham, being the second son by the first marriage.

The Gas Undertakings Returns.—On Monday last week, the returns relating to the gas undertakings of the United Kingdom, for the year ending Dec. 30, 1898, and March 25, 1899, respectively, were presented to the House of Commons, in compliance with an order made on the 16th of May.

Reproductive Municipal Undertakings in Scotland.—Just before the rising of Parliament, the return moved for by Mr. John Leng on the 23rd of March, in regard to the reproductive undertakings in the hands of municipal corporations in Scotland, was presented. It furnishes particulars similar to those contained in the return asked for by Sir Henry Fowler in the previous session of Parliament, and which was confined to England and Wales.

New Coalfield in Lincolnshire.—The question of whether or not the coal-seams of the North and the Midlands extend to Lincolnshire, which has been discussed from time to time during the past thirty years, appears now to have been definitely settled. Borings which have lately been made at South Carr have, it is reported, passed through several seams, the principal of which—the Shafton seam—was met at a depth of 682 yards. This has been declared to be workable. The well-known Barnsley bed, although divided, has been found at a depth of 1053 yards, and is 8 ft. 8 in. thick. This discovery of coal, although at such great depth, is regarded as highly promising, and preparations are being made for the establishment of a colliery at South Carr. The nearest colliery in South Yorkshire (at South Kirby) is working the same seam at a depth of 635 yards; while at Cadeby it is still deeper.

PERSONAL.

The Colne Town Council have increased the salary of Mr. F. THORPE, their Gas Engineer and Manager, by £50 a year.

The Directors and employees of the New Conveyor Company, Limited, have presented to Mr. F. W. ORDISH, Chief Draughtsman, and Mr. W. BELL, Foreman Pattern Maker, drawing and dining room clocks, on the occasion of their marriages.

Mr. H. LAWTON, of Carnforth, has been appointed Manager of the Airdale Gas Company's works at Idle, near Bradford, in succession to Mr. S. Senior. There were 81 applicants for the position, which was advertised in the "JOURNAL" for the 25th ult.

Mr. J. W. NAPIER, of Auchterarder, has been selected, out of a large number of applicants, for the position of Manager of the Carnoustie Gas-Works. Mr. Napier had his practical training under his father, at Crieff; and for the past five years has had the entire management of the works he is now leaving.

In the "JOURNAL" for Aug. 1, it was stated that Mr. W. ORME was leaving Congleton to take the management of the Wirksworth Gas-Works. We now learn from him that, at the urgent request of the Town Council, accompanied by an immediate addition to his salary, he has agreed to remain with them. Mr. S. HALSTEAD, of Bolsover, has been appointed Gas Manager at Wirksworth.

At the meeting of the Sheffield City Council last Wednesday, the salary of Mr. W. TERREY, the General Manager of the Water Department, was increased by £200 per annum, in recognition of the special services rendered by him in connection with the Derwent Water Bill; Mr. L. S. M. MARSH, the Engineer, Mr. H. SAYER, the Town Clerk, and Mr. G. H. HARRISON, an official in the Town Clerk's Department, receiving sums of £200, £250, and £50 respectively.

After a service of 41 years, Mr. R. ROBINSON is retiring, at the age of 75, from the management of the Witham Gas-Works. He succeeded Mr. James Church (brother of Mr. Samuel Church, of the City of London Gas Company), who had held the position of Manager from the formation of the Company in 1835 till March, 1858, when he died. Under Mr. Robinson's management, the income of the Company has increased from £686 in 1861 to £1660 last year; while the price of gas has been reduced from 6s. 8d. to 4s. 7d. per 1000 cubic feet, and the dividends increased from 5 to 7 per cent.—an additional ½ per cent. being paid in several years. The Directors of the Company have decided to make Mr. Robinson a present of £50 in recognition of his services.

It was mentioned by Colonel Makins, at the recent half-yearly general meeting of the Gaslight and Coke Company that the Directors had agreed to the appointment by the Company's Auditors of an assistant, to enable them to extend the scope of their audit. The Assistant-Auditor referred to is Mr. JOHN A. STONEHAM, son of Mr. Allen Stoneham, one of the two Auditors elected by the shareholders. It will have been observed that the accounts of the Company for the past half year do not bear the signature of Mr. H. W. CHISHOLM, who is co-Auditor with Mr. Stoneham. This is due to the serious and long-continued indisposition of Mr. Chisholm; and we regret to learn it is not considered probable that, as he is over ninety years of age, he will ever be able to resume his duties.

NOTES.

Iron-Felt for Insulating Vibration.

A new material, known as "iron-felt," is being made at the Aldershof Works, near Berlin. The felt, according to the "Manufacturer," consists essentially of long, tough woollen fibres impregnated with a bye-product of petroleum, and then coated—with a certain amount of penetration—by an insoluble gelatine, and also (alternatively or in addition) with india-rubber, subsequently vulcanized. Upon being subjected to considerable pressure, the iron-felt assumes the form of plates, measuring 20 square centimetres and upwards, and varying from 1 to 5 centimetres in thickness. These plates are very elastic and practically imperishable, while they will stand a pressure of over 20,000 lbs. per square inch, and their surface is so hard as not to be cut by the sharp edges of bolt-heads or iron girders. Placed as a cushion between rails and their chairs or sleepers, under plummer-blocks, or between engines and their foundations, this material, it is claimed, will prevent vibration.

The Philosophy of the Wiped Joint.

An interesting explanation of how it is that a plumber can "wipe" a joint—that is, as to why the metal used for this purpose remains plastic for a sufficient length of time—is given in a paper on pig iron, by Mr. Thos. D. West. It is a question of the segregation on freezing of different substances which existed in solution together while the mother liquor remained fluid. Metals, like water, can hold an excess of foreign substances in solution while in the fluid state which will come out at the freezing temperature. There is a proportion of the mixture which will remain constant in freezing, and this constitutes what is called the mother metal, in the case of metallic alloys. Whenever a molten alloy contains an excess of one or more of the ingredients that go to constitute the mother metal, then this excess will separate out on cooling, and solidify before the mother metal freezes or solidifies. If the plumber's solder consisted of such a mixture of lead and tin as constitutes a mother metal, it would be impossible to wipe a joint with it, because the blend would set all at once. But there is in the solder an excess of lead, which begins to separate out and freeze, and continues freezing while the plumber is wiping his joint. At the end of the operation, the whole composition freezes together, and there is no further separation.

The Advance of Steam Heating.

Mr. William S. Monroe, describing in the "Engineering Record" the most modern systems of steam heating in vogue in the United States, treats the increasing use of this means of warming public buildings and private residences as a necessary accompaniment of development from a primitive life to a congested and complex civilization. He suggests a useful classification for buildings into those which are "densely peopled," and those which are "sparsely peopled." The former includes factories, school-houses, churches, hospitals, theatres, and assembly-rooms generally. The presumption is that in all such cases mechanically assisted ventilation is to be regarded as a prime necessary, no matter how the interior is heated or lighted. This mechanical assistance, it might also be observed, is available in several forms, especially in the shape of fans driven by gas, hot air, or electric power. In the category of "sparsely peopled" interiors are included most private dwellings, for which natural ventilation by means of windows, chimneys, and air-shafts is ordinarily sufficient. In Mr. Monroe's opinion, the extending use of economical means of heating domestic interiors, beginning with the semi-private buildings, such as hotels, commercial offices, &c., will render it imperative to reconsider the ventilation arrangements of such interiors. There has been as yet little experiment in this direction; but the course of the development appears to be plainly marked out.

Coke Breeze Concrete for Fireproof Floors.

An important test of the behaviour of a floor made of wooden joists filled in with different kinds of concrete, has been conducted by the Executive of the British Fire Prevention Committee. The idea was to ascertain the effect on such a floor of a smouldering fire of 30 minutes' duration, at a temperature not exceeding 800° Fahr., followed by a fierce fire lasting for an hour, gradually increasing to a temperature of 2500° Fahr. After this, a stream of cold water was suddenly turned on for four minutes. The floor was of 100 feet area, divided into three equal parts, each filled with a different make of concrete. It was not loaded. The result was that with the named conditions the joists caught fire, and parts of the soffit of the concrete filling were disintegrated, particularly by the water. The floor stood, however, during the test, although it appeared to be seriously weakened. It collapsed five hours later, when the flooring-boards over the joists were found to be charred on the under side and at the joists. But they did not catch fire. The most significant result observed was that the concrete made with coke breeze resisted the fire better than that made with ballast alone, or with a mixture of ballast and breeze. In view of the objection that has often been made to coke breeze as an agglomerant for concrete, on the score of its combustible nature, this test deserves to be prominently noticed.

The Fixation of Iridescent Films.

A remarkable statement, apparently emanating from a French source, recently appeared in "Engineering," ascribing to M. Charles Henry, of the Paris Sorbonne, the successful fixing of the interference colours exhibited by oil or tar films floating on water. Everyone who has noticed this iridescent effect—and who has not?—must have wondered whether it could be arrested and made permanently visible. The impossibility of converting into a pigment what was essentially an optical phenomenon, has hitherto been accepted. M. Henry, however, has attacked the problem with strict regard to its essential character. Not every oil or solution is amenable to his treatment. Those that are suitable are called "irichromatines." In order that a liquid may spread upon the surface of water, it is necessary that the sum of its surface tensions, with regard to water and air, should be less than the surface tension of water with regard to air. Moroever, the liquid must neither mix with nor be soluble in water, and must not be too volatile. M. Henry starts with a mixture of two liquids—one being a solution of damar gum in turpentine, and the other of Judæa bitumen in benzene. These give a film on water of a thickness of about 0·4 micro-millimetre (thousandth of a millimetre); being intermediate between the wave-lengths of red and blue light. The mixture evaporates slowly, and hardens on exposure to air and light. A band of paper is prepared by coating with gelatine, rendered insoluble by means of formaldehyde. This paper is drawn through a vat of water upon which the coloured film floats, and the film fixes itself upon the gelatine.

The Flash-Point as a Means of Research.

Herr P. N. Raikow has been engaged in carrying the investigation of the "flash-point" of organic substances beyond the usual petroleum oils to which this method of examination is ordinarily confined. The temperature at which other inflammable bodies show a flash, or take fire, is not without practical and scientific

interest; yet chemical literature is quite silent on the subject. The preliminary researches of the author have shown, among other things, that the point of ignition of many organic compounds lies at a considerably lower temperature than their melting-point. For instance, the melting-point of benzene is 6° C.; but its flash-point is below −8° C., at which temperature it flashes nearly as readily as when it is liquid. The knowledge of the point of inflammability is often of as much importance as that of the melting or the boiling point. It is noticed that, under the same conditions of experiment, the flash-point of an organic body is constant, and that it is raised or lowered by admixture with another body, according as the flash-point of the latter is higher or lower. By this rule it is possible to detect certain admixtures. For example, pure alcohol flashes at 12° C., whereas a mixture of 96 parts of water and 4 parts of alcohol, by volume, flashes at 68° C. A weaker alcoholic solution does not flash. Thus the method can be employed for wine testing. The author intends to prosecute his researches with a view to ascertaining whether there is any relation between the flash-point and the molecular weight of substances.

The Testing of Portland Cement for Soundness.

A critical examination of tests of portland cement has been made during the past year by Herr Gary, at the Berlin Royal Research Laboratory. The question was as to the reliability of various tests in common use, or advocated by experts, with the object of showing the "soundness" of cement. Most of these tests involved roasting or boiling the sample. A typical test is that of Michaelis, who makes pats of neat cement one centimetre thick in the middle, thinning at the edges. After hardening for 24 hours in a damp atmosphere, the pat is immersed in a bath of cold water, which is then gradually raised to the boil, and kept at the boiling temperature for three hours. The conclusion arrived at is that none of the so-called quick tests for soundness are reliable in all cases. Increase of strength on hardening in water and air, is an evidence of the practical fitness of a cement. The standard official German tests appear to be sufficient for enabling a cement to be judged, and must be retained as absolute until a really reliable quick test for soundness has been discovered. It is something to learn that, after all that has been written and said about cement testing, there is still something wanting in this regard; and this with respect to one of the most important elements of value in a cement. It is not stated how or in what respect the tests for soundness failed; but the thought that there is no reliable indication of this quality is not a comforting one for engineers.

Scraping Water-Mains.

The success of the operation of scraping a water-main, as recently reported in the case of Plymouth, may be imagined to be dependent upon the non-existence of such obstructions in the pipe as would prevent the passage of the scraper. From a statement made by Mr. D. Brackett, of Boston, to the New England Water-Works Association, it may be gathered that scrapers can be made to do useful work notwithstanding the interference of the ends of service-pipes and stopcocks, projecting into the pipe as much as $\frac{1}{2}$ inch or more. The water-mains laid in Old Boston from 1848 to 1868 were uncoated, and their interior had become encrusted with tubercles from $\frac{3}{8}$ inch to $1\frac{1}{4}$ inches thick. This coating very seriously affected the delivering capacity of the pipes, and, in the case of the smaller sizes, rendered them practically useless for fire service. The machine used for scraping the mains was made with a flexible central shaft of coiled steel spring, $3\frac{1}{2}$ feet long, carrying small castings to which were hinged steel scrapers, arranged radially round the shaft 12 inches apart. The scrapers were kept against the sides of the pipe by coiled springs, which permitted them to turn back when they encountered pipe ends. Behind the machine were two rubber pistons 2 feet apart, so as to ensure a pressure when passing branches. The ordinary water pressure of from 30 lbs. to 45 lbs. forced the machine through the main as fast as a man could walk. Interesting measurements of the discharging capacity of 525 feet of 6-inch main, 38 years old, were made before and after cleaning. The effect of the tubercles was to reduce the rate of flow to from 25 to 35 per cent. of the proper quantity; while the cleaning more than doubled the average flow.

Crystal Palace School of Practical Engineering.—The distribution of certificates to the successful students at the summer term examination of the School took place last Friday at the Palace—Mr. F. Fox, Joint Engineer of the Great Central Railway, presiding. Mr. James W. Helps, Engineer and Manager of the Croydon Gas Company, who examined the students in the Mechanical Section, reported upon the excellent methods adopted in the educational course. He said he was struck with the high merit of the work done in the pattern-shops by several students; while both in the fitting-shop and the drawing-office, he saw much to prove the possession of considerable ability. Prior to the presentation of the certificates, the Chairman said that a recent visit to America had opened his eyes to the serious state of things which existed for English engineers. In this country, we appeared to be more or less asleep, and needed to be aroused. Young engineers of the present day should strike out, and be more and more technical and specialized. England at one time was the workshop of the world; but all this had changed, and fierce competition was now met in all quarters.

COMMUNICATED ARTICLE.

27·68.

By Henry O'Connor, Assoc.M.Inst. C.E.

The heading of this article is somewhat peculiar, and to some, perhaps, unintelligible; but if examined it will be seen to have a special interest to all students of gas engineering problems. We are all accustomed to carry in our heads certain figures for simple calculations such as π, or the ratio of the diameter of a circle to its circumference, or 3·1416, and the area, 0·7854. But the figures now under notice are of equal importance to the gas engineer. Let us then inquire what they mean. A column of water 27·68 inches high, 1 inch broad, and 1 inch thick, weighs exactly 1 lb. This can be easily worked out from the usual formula. One cubic foot of water weighs 62·425 lbs.; therefore 1728 cubic inches (1 cubic foot) divided by 62·425 equals 27·68. So much for the data. Now let us see what use the gas engineer can make of them. We have learnt that a column of water of 1 square inch area and 27·68 inches high equals 1 lb. weight. Then if we place this column resting on this one square inch area, we have a weight of 1 lb. pressing on the 1 square inch, or, as it is generally put, 1 lb. per square inch. The gas engineer is accustomed to measure pressures of gas by the height of a column of water, usually expressed in inches and tenths. Then, first and foremost, we learn that 27 inches and nearly 7-tenths pressure of water equals 1 lb. per square inch; and this becomes our starting-point for many calculations of interest in our profession.

Do we want to know the weight of a gasholder? Then we have only to find its internal area in square inches, multiply this by the number of inches pressure thrown by it, and divided by 27·68, and we have the weight in pounds. The reverse of this, of course, holds good, and is equally simple. If we have the weight and area, we can find the pressure which will be thrown. Thus: The weight of the holder in pounds multiplied by 27·68, and divided by the area in square inches, equals the pressure in inches of water. It should be remembered that in all cases it is the area of the inside of the holder at the water-level that should be taken. When balance-weights are used to reduce the pressure thrown by a holder, these again are calculated by the same figures. Each inch pressure to be reduced requires a weight of 1 lb. for every 27·68 square inches contained in the area of the gasholder; this weight, of course, being divided among the number of counterbalance weights employed. In calculating the strains on the top sheets of gasholders or purifiers, these figures again come into use; the upward pressure of the gas in pounds being found by dividing the number of square inches in the area of the holder by 27·68, and multiplying by the number of inches pressure of water thrown by the holder. To find the strain on the holding-down bolts, &c., of a purifier, take the area of the purifier in square inches, multiply by the pressure of the gas, divide by 27·68, and this will equal the upward pressure in pounds due to the gas. From this falls to be deducted the weight of the metal in the cover to get at the actual pull upon the bolts.

If we are designing a station governor, and wish to know what weights are required to cause the governor to throw certain pressures on the outlet, we have again to use this figure. Having balanced the bell, we must find the area of it in square inches, and divide this by 27·68, which will give us the weight required for each inch of pressure; the weight for any other pressure being found by a direct proportion sum. The same calculation holds good with reference to a district governor or pressure reducer, and also to a governor for regulating the bye-pass of an exhauster or the steam inlet to its engine. Another method of finding the weight is by taking the quantity of water required to cover the area of the top of the bell by 1-inch deep. The weight of this water is the required weight to throw 1-inch pressure. The weight of the cone of a governor, which was often made of sheet metal, must be such that it will more than exceed the upward pressure of the gas, or the cone will close the aperture in the seat. Thus a cone measuring 10 inches diameter at the base must weigh more than 2·8 lbs. for each 1 inch inlet pressure, or the upward tendency of the gas will lift the cone, close the aperture, and prevent the passage of the gas.

The compression of gases is usually spoken of in atmospheres; each atmosphere being taken roughly at 15 lbs. per square inch. To express this in inches of water, we multiply the 15 by 27·68. More properly this should be 14·706, which is the normal pressure of the atmosphere; but the round figure 15 is usually taken for rough calculations. At the normal pressure, the atmosphere will only support a column of water 33·9 feet high, because this height in inches (say, 407) divided by 27·68, the number of inches supported by each pound pressure, equals 14·706, the number of pounds pressure of the atmosphere. Mercury, however, is some 13·6 times as heavy as water; hence only 2·035 inches of mercury equals 1 pound per square inch. Therefore a column of mercury 29·92 inches high represents the pressure of the atmosphere in the same way as 33·9 feet head of water, because 13·6 divided into 27·68 equals 2·035, and 13·6 divided into 33·9 feet, or 407 inches, equals 29·92.

For the pressure on gasholder or other tanks, these figures again help us. For every 27·68 inches depth of water, there is

a pressure of 1 pound on every square inch of the bottom of the tank. Thus a tank 830·4 inches deep has a pressure of 30 lbs. on every square inch of the bottom. For the pressure on the sides we have, at 27·68 inches deep, 1 lb.; at 55·36 inches deep, 2 lbs.; at 83·04 inches deep, 3 lbs.; and so on. A tank of water is placed so many feet above its outlet. Then the pressure at the outlet is 1 lb. for each 27·68 inches that the tank is above the outlet, or, to speak strictly accurately, that the surface of the water in the tank is above the outlet. Pipes are usually tested to so many feet head of water. This can be translated into pounds per square inch by the same figures. Divide the height in inches by 27·68, and we have the number of pounds per square inch at which they were tested. Thus 300 feet head equals 130·05 lbs. per square inch.

The preceding instances of the usefulness of these figures will serve to show their importance. They are, however, only examples; and the student will find a number of other calculations based on the same foundation. Sufficient, however, has been said, it is believed, to cause some at least to carry these figures in their mind, and to enable them to apply them where required.

TECHNICAL RECORD.

NORTH OF IRELAND ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Dublin.

The Twelfth Annual Meeting of the Association was held in the City Hall, Dublin, last Tuesday—Mr. J. AUCHTERLONIE, of Mullingar, the President for the year, in the chair. There was a very good attendance.

REPORT AND ACCOUNTS.

The report of the Committee, with the accounts, was submitted. The Committee expressed regret that during the year death had claimed one of their number—Mr. Patrick Egan, of Tralee. A memorial wreath was sent, in the name of the Association, to his funeral. Knowing that he had left a large family, not well provided for, £5 was voted from the funds of the Association, which the Committee supplemented by individual subscriptions; so that a sum of £12 7s. was sent to the widow and family. This year, again, no competition papers had been received; and the Committee were obliged to solicit papers from likely contributors in the ordinary way, with the result that appeared on the day's programme. Professor Tichborne, too, whose lecture on the occasion of their last visit to Dublin was so highly appreciated, had kindly consented to deliver another that day on a subject of vast importance to gas managers.

The abstract of accounts showed a balance in hand of £24 18s. 11d. The membership of the Association stood as follows: Ordinary members, 56; extra-ordinary members, 26; honorary members, 2—total, 84.

On the motion of Mr. D. WILLIAMSON (Clones), seconded by Mr. F. EUSTACE (Tullamore), the report and accounts were unanimously adopted.

NEW MEMBERS.

The following gentlemen were, on the motion of Mr. S. B. LANGLANDS (Coleraine), seconded by Mr. J. G. TOOMS, of Carrick-on-Suir, admitted to the Association:—

Ordinary Members.—Barrett, P., Rathkeale; Dunn, J., Auchnacloy; Egan, M., Tralee; Fagan, G., Clara; Kneeshaw, W., Clonmel; Maloney, T., Cashel; Patterson, J., Tipperary; Richmond, J., Kilkenny; Skinner, Robert J., Londonderry; Stewart, G. H., Ennis; Stott, C. W., Parsonstown.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Someone has said that there is nothing in the world so delightful as the bliss of requited love. But the conditions of human life are such that even this brings responsibilities in its train. So, for the first eleven months of his office, the President of your Association has a very pleasant time to enjoy the privileges and honours of his position. But time passes, and he has soon to account for the faith that has been placed in him; and, to quote a phrase of one of our prominent empire makers, he has to "face the music"—the music in this case being the delivery of an address to a body of gentlemen, most of whom have far greater experience and ability than myself. In fact, so conscious am I of my shortcomings at this moment, that I am like a nervous gentleman of my acquaintance who so dreaded the ordeal of appearing before the hymeneal altar, that he was constantly debating whether or no he should pack up and make off before it was too late. Soldiers, however, tell us that it takes a brave man to run away from his comrades, and that it is fear that often impels them forward. Knowing how little of importance I can communicate to such a Society as ours, and our meeting coming so late in the season, when so many able Presidents of other Associations have already touched in a masterly fashion on all the current subjects of interest to the profession, it is only fear of ridicule, and the assurance of your kindly and sympathetic support, that has prevented my proving an absentee.

Casting about in my mind as to the why and the wherefore of Inaugural Addresses, I have come to the conclusion that it is a very reasonable practice for the Presidents to touch on the success, or otherwise, of the Societies they preside over, and to give a brief *résumé* of the progress made by the profession as a whole. In our desire for change and advancement, however, addresses have been so elaborated that they have become rather an infliction both to hearers and deliverers, unless the President has happened to be one of the pioneers in experiment and discovery. Keeping this in view, I shall confine my few remarks to what concerns the management of small gas-works, more particularly in Ireland. But before proceeding to my subject proper, I must thank you all very heartily and sincerely for the honour you have done me in electing me to the presidential chair. If I do not rise to the level of your hopes, I trust I may leave my office with its prestige undiminished.

Gas managers in Ireland suffer under many disadvantages compared with their brethren on the other side of the Channel. In the first place, we are far removed from the coalfields; and although we are again and again assured that there is an abundance of coal in Ireland, we have still to go on paying from two to three times the price paid by our more fortunate *confrères* on the other side. The same may be said of fire-clay goods, and, in fact, of all our manufacturing plant. Again, we have to face poor prices for tar and liquor; the latter product being in many cases a source of expense instead of revenue. Our constituencies are small; and the extent of our mains, with correspondingly high leakage, is excessive compared to the output of gas and number of consumers. Nor is this latter state of affairs likely to be improved in the future; for under the Labourers Cottages Acts our suburbs are being taken up with this class of houses, with their half-acre or more of land, and mains have to be run to light the roadways, and as there is no prospect of any return further than the few street-lamps, I fear that our unaccounted-for gas will still remain high. These causes handicap us severely, and put us entirely out of court in the struggle for statistical supremacy in the economical manufacture of gas.

There are other causes, however, which I consider detrimental to the efficiency of our works, and which, in my opinion, could be improved upon; and I would briefly direct your attention to a few of them. It is an undoubted fact that many of the smaller works in Ireland—and elsewhere, for the matter of that—are antiquated and too small for the requirements. When the manager is thoroughly competent and energetic, he works up the concern to a point that requires additional plant. But through want of enterprise or dread of competition, the outlay is refused by the commissioners or directors, with the result that progress is crippled, the cost of production remains high, and the owners leave themselves in a very weak position in the event of competition. If companies and corporations have faith and confidence in their managers, they ought to give them every assistance in the way of providing capital for the carrying out of extensions and improvements.

In these days when managers all over the kingdom throw open their works to the profession for inspection, and when they are always willing to place the results of their workings before the different associations, there need be no fear of risky experiments. Where an enlightened policy has prevailed, gas lighting is practically unassailable by any of its rivals. The proof of this is to be witnessed in several of our corporation gas-works, transferred at exorbitant valuations, more or less dilapidated when bought, and remodelled at great cost, with the result that, in spite of the heavy capital charges, the economy in working has warranted considerable reductions in the price of gas.

The maxim that the dividend is made in the retort-house is now widely recognized; and this is very evident from the great improvement that has taken place in this part of our works within recent years. After the consensus of opinion in favour of regenerative firing in one form or another, the surprise is not at the wide adoption of improved settings, but rather at the tardy recognition of their great advantage over the ordinary settings. The expense of the full depth producers, and even of the semi-regenerative settings, has kept many managers of small works from adopting them. However, our friend, Mr. Reid, of Longford, will to-day give us his experience with a setting which is within the reach of all, as far as expense goes. As we shall have a further opportunity of reverting to the subject of retorts, let me only remark that the one drawback to high heats is choked ascension-pipes. In a communication to the "JOURNAL OF GAS LIGHTING" of the 1st of August, Mr. S. Carpenter states that he is about to offer a new style of main which will, he believes, reduce stoppages to the extent of 70 to 80 per cent. This is good news indeed; and Mr. Carpenter, who already deserves well at the hands of the gas profession for his many lucid and instructive articles, will have earned the everlasting thanks of managers and stokers alike.

Condensation in most small works—and, I am afraid, in many of our larger works as well—is pretty much left to take care of itself. It has often struck me that, with the trouble expended in securing a gradual cooling by means of foul mains, &c., no general care has been taken to protect the washing and purifying plant from climatic changes. Recently I noticed a case of a works amply provided with thermometers, valves, &c., where the gas was entering the condensers at 80°, and leaving at 86°. I do not see how, without infinite trouble, the temperature of the gas when leaving the condensers can be constantly maintained at

55° or 60°; and even if we did manage it, I fail to see the advantage of maintaining it at that temperature, if we immediately afterwards bring it into contact with water possibly very little above freezing point, and thence through purifiers and into holders fully exposed to all the changes of our climate.

I am glad to see a general improvement in the washing plant throughout our works. Many of the washers on the market are very compact and effective; and nothing can be more advantageous in regard to purification than effective washing. One matter, however, is worthy of consideration in small works, and that is back-pressure. Many washers throw a considerable back-pressure; and where there is no exhauster, it is a considerable disadvantage—more especially if the heats are high. I would advise managers to bear this in mind when considering the merits of the various washers.

I have very little to say regarding purification. Thanks to the many instructive articles that have lately appeared in our technical journals, we have a clearer idea of the chemical action that takes place in the boxes. The main consideration is to have ample area to get the full efficiency out of the lime.

I presume it is on account of the cost of gasholders that we find so few of our works with anything like adequate storage. This, undoubtedly, is one of the greatest drawbacks to successful management, in addition to being a constant source of danger and worry. Some works I know have not storage for two-fifths of the maximum output. This necessitates extra furnaces and retorts, with corresponding loss of coke, additional wages, and wear and tear of plant. Nothing can be more annoying than to have to reduce the pressure in the evening, when the retorts have been lying idle all the forenoon.

I do not know that I need make any remark regarding prepayment meters and cooking stoves. I am afraid, after the poetically-embellished articles that appeared in our journals some time ago, there is little that could be added that would not seem insipid. At the same time, we are glad to welcome the author of these articles to our shores in a business capacity. There is a large field for manufacturers of cooking stoves; and our profession, as a whole, is bound to share in the enterprise and success of these manufacturers. One of our members last year prophesied that the penny-in-the-slot meter would yet be the backbone of the gas profession. I think, in some of our industrial towns, this is already the case; and in most other towns the custom derived from this class of consumers is no inconsiderable portion of the total.

To-day we are to have a paper on our "financial relations" with our consumers, in the form of differential rates. I hope this question will be debated upon a broad basis, and that all our members will speak their minds. Personally I approve of differential rates, as a means to an end—that end being the reduction of the price of gas all round, by reason of the economy resulting from increased manufacture. I do not contend that we ought to sell gas at a loss; but, if necessary, I would be prepared to sell at a very small margin above cost price, rather than lose a customer. When we find electric light companies catering for motive power at 1d. per unit, as I believe is done in Manchester, it behoves us, as intelligent business men, to make hay while the sun shines as well as when it is not shining.

I think some managers are too much inclined to under-estimate the electric light. To my mind, this is a mistake. Undoubtedly our position is secure for many years to come; but with so many able scientists constantly experimenting, and electric traction gaining a powerful foothold, the cost of generation will not increase, neither will the industry fall back. Let each and all of us, therefore, do our best to make the position of gas manufacture secure; and, in sporting phraseology, do not wait until we are "caught in the straight" before we "come away."

In the "Electrical Review" of the 28th of July, there appeared an article describing a new gas-engine manufactured by the Westinghouse Electrical Company. This firm, who are the leading Electric Traction Company in America, are opening works in Manchester, backed by a capital of £1,500,000, and with Lord Kelvin as adviser. This engine will form one of the staple manufactures of the Company. The chief claims put forward on behalf of the new engines are better governing, better admixture of gas and air, and regularity of explosion. There will be no "hit and miss" about them, and consequently none of that fluctuation in the lights which has been the great drawback to gas-engines as a means of driving dynamos. These engines are largely used on the other side of the Atlantic for generating electricity, and are being made up to 1500 brake horse power.

Last year we had an excellent paper on the "Workmen's Compensation Act," from our esteemed friend Mr. Gibb. I am glad to notice that we are now having offers of insurance at 5s. per £100; and I daresay this will be reduced still further when Insurance Companies find how comparatively few accidents occur in gas-works.

The Gas Institute took no action with regard to the standardizing of meter-unions. I understand, however, that the meter manufacturers are considering the matter with a view to uniformity.

As I stated at the beginning of my address, we receive very small prices for tar and liquor in Ireland. Whatever tar cannot be sold locally has usually to be burned. Fortunately, I have always managed to get over 1d. per gallon for my surplus tar; and this I consider its equivalent as fuel. This being a purely grazing district, and the soil being so rich as to require little or no artificial manure, we gas managers have small inducement to start the manufacture of sulphate of ammonia. There seems, however, to be an inclination in many quarters to revert to tillage, if not for increased profit to landlord and tenant, at least for the benefit of the community as a whole, by increasing the population and developing the resources of the soil. Should any general movement in this direction take place, we gas managers situated in the grazing districts are bound to benefit by the change; and it is to be hoped that the splendid prize essay on the "Utility of Sulphate of Ammonia in Agriculture," by Mr. James Muir, M.R.A.C., which recently appeared in the "Journal of Gas Lighting," will be published in cheap pamphlet form, so that it may be largerly circulated among the farmers and agricultural experts.

We have all heard a good deal lately about the extraordinary results obtained from "intensified gas-light"—a burner consuming 10 cubic feet per hour under a pressure of 9 inches yielding a light equal to 300 candles. The pressure is produced by a water pressure-increaser; and I have it that for an installation of 30 lights the cost would be about £50, exclusive of burners. We are promised another pressure-increaser in the form of a hot-air motor; but whether this would be cheaper than the water power I am not at present in a position to say. I have had great satisfaction with the new No. 4 incandescent burner. It is really a splendid light when there is a proper adjustment of gas and air supply. I keep a small stock of nipples, and adjust all burners to meet the requirements of the various pressures.

And now, in concluding this address, abounding in platitudes and imperfections, let me congratulate you and our worthy Secretary on the flourishing condition of our Society. It is a great matter for satisfaction to find our Association being so largely availed of by the southern managers; and it is a question whether the Association might not now fairly claim to represent the whole of Ireland. No one can deny that it has made wonderful progress during the twelve years of its existence. Like most other Associations, it has had its periods of trial; but, on the whole, since the time when some twenty managers, on Mr. Whimster's invitation, met in Armagh and formed the Association, it has fulfilled, in a remarkable degree, the object for which it was founded—viz., to encourage and advance all matters connected with gas engineering, and to facilitate the exchange of information and ideas among its members. Scattered as we are throughout the length and breadth of the land, with long distances often separating the various towns—in my own case, my nearest neighbour is some 26 miles away—we have few opportunities of comparing notes with each other; and it is only at certain intervals that we can meet together for mutual benefit. Who does not feel enlightened and stimulated by the annual gatherings of our Association, by the practical papers on every-day subjects, and by the lectures by such prominent Chemists as our learned friend—for he has been a friend indeed to our Association—Dr. Tichborne, and Professors Lewes and Macadam.

Our past President, Mr. Nisbet, of Portadown, last year spoke wise words when he said, "Let no one think he has already learned as much of his business as he will require, for in this progressive age something new is turning up almost every day." These are true words; and anyone who reads the transactions of our several associations must be struck with the variety of subjects with which gas managers must be conversant. Like our Navy, we have to be ready and able for any rival or combination of rivals. We are now at close quarters with paraffin, coal, and electric light; and I think we may rest satisfied with being able to give a good account of ourselves. Shall I be considered a visionary if I say we are only at the beginning of the possibilities of our industry, and that as time goes on, and our knowledge and education advance and competition becomes keener, we shall ultimately direct our energies to the more profitable disposal of our tar and liquor, in the form of carbonate of ammonia, anthracene, carbolic acid, sulphuric acid, dyes, &c.? I fancy most of us consider we have quite sufficient worry without undertaking further responsibilities. I only mention these products to show what a large field for enterprise still remains practically untouched.

Lecture by Professor Tichborne.

Professor C. R. C. Tichborne, LL.D., F.I.C., &c., of Dublin, then delivered the following lecture:—

ON THE CONTINUOUS MODE OF TESTING GAS.

In 1892 I had the pleasure of addressing this Association "On the Value of the Bye-Products of Gas-Works, and on Improved Methods of Estimating Them." I then dealt chiefly with the Metropolitan Gas Referees' methods for the estimation of ammonia and the total sulphur. I propose now to give you what, if you like, you may consider to be a continuation of that subject; but I should say at once that it only touches upon the estimation of ammonia.

In the previous paper I pointed out that a great change had occurred in the position since the days when the Referees first made their regulations. At that period it was only a question of providing against a very high percentage of ingredients which were then viewed as impurities. But now the manufacturer of

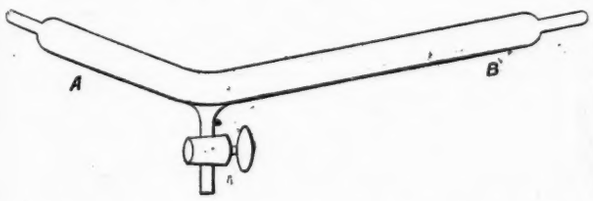
gas finds these substances of such commercial value that he displays the greatest anxiety to separate them as far as possible from the gas. If he is not getting his proper proportion of ammonia and sulphur, it is so much money lost. In most cases he has to sell the bye-products on the unit of sulphur or ammonia which they contain; and therefore the estimation of these substances has become a question of the highest importance to him.

Now the following is the *modus operandi* of the Referees' process for ammonia. A volumetric or standard solution of sulphuric acid is taken; and a measured amount of this solution is placed in a glass cylinder filled with glass beads, and provided with a tap at one end. At this point comes in a possible source of error. Some scientific instrument makers send out an apparatus filled with common beads made of soft glass, that so act upon the sulphuric acid as to render experiments quite useless.

But to resume. This cylinder is not easy to manipulate. You have to insert the exact quantity of volumetric acid into it, and, after closing the tap, turn the cylinder round and round until the whole surface of the beads is well covered. Not only does this require careful manipulation, but at the end of the operation it is difficult to wash out the cylinder so as to be quite certain that you have removed all the contents. If the washing be imperfectly done—say, from haste or careless manipulation—the determination is hopelessly wrong.

After charging the cylinder with the acid, the gas is slowly passed through it—say, at the rate of 2 cubic feet per hour—until the 10 cubic feet have passed. The ammonia in the gas is, of course, at once arrested or neutralized by the sulphuric acid. The contents of the cylinder and washings therefrom are then estimated by a volumetric solution of ammonia; and the difference between the volume of ammonia solution which would be originally required by the acid used, and the volume absolutely used after passing the gas, represents the ammonia which has been absorbed from the 10 cubic feet of gas. This may be said to be a concise description of the process—sufficient to remind us of the points requisite to compare with the process I am now about to describe in detail.

This process involves no manipulatory trouble, is not performed by isolated experiments, and requires no volumetric estimation. If a few simple precautions are taken, the process is absolutely correct. It is essentially a process of saturating a standard solution of acid, but only thus far does it resemble the Referees' process. I pass the gas through two absorption tubes of a



peculiar shape. Let us call one A, and the other B. These tubes are very simple, are specially suited for gas washing, and do not produce any back-pressure. Each tube has two limbs, so placed as to have a slight angle to each other—say, an angle of 150°. At each end are narrow inlet and outlet tubes respectively, which can be connected by india-rubber tubing the size of a quill to the gas supply, &c., as required. The short limb is the inlet, and the long one the outlet. The two tubes are placed on a stand, and the outlet of A connected with the inlet of B. At the angle of the two limbs is a stopcock, by which the tubes can be emptied. As thus arranged, they are ready to work. Ten cubic centimetres of standard acid are introduced into each tube; and the gas supply is connected with the inlet of A, and the experimental meter with the outlet of B. The gas is then allowed to pass slowly. The standard acid acts as a trap at the bend of the tube. In fact, the gas keeps forcing the liquid up the tube; and as the liquid keeps falling back, a constant movement of liquid and gas is maintained.

It will now be necessary to describe the volumetric solution. I prefer to make it so that each 5 c.c. = 0·00064 gramme, or 0·01 grain, of ammonia (NH_3). It is prepared in the ordinary manner—which I need not trouble you with now—or it can be prepared at any of the establishments which make chemical tests. But before making up the final measure, half a grain of methyl orange to each litre should be added. This solution should be made up to its final volume at 60° Fahr. Such a solution is bright red. Methyl orange is supposed to be the most appropriate indicator for ammonia.

Now, as the gas slowly passes through the tubes, you get a point when the tube A becomes yellow, instead of red. You know that the gas passed has contained sufficient ammonia to represent 0·02 grain, the equivalent of your 10 c.c. of acid, and you note the volume of gas registered. The saturated standard solution is now removed by the tap from A, and a fresh 10 c.c. introduced. At the same time we now connect B with the gas, and let A become the outlet to the meter. The object of this is that any traces of the ammonia which might possibly have escaped A are now locked up in B. So the experiments go on continuously; it being only necessary to have a note-book, ruled in three columns—one for the date, one for the measure of the gas, and the third for the ammonia. Thus—

Date.	Gas in Cubic Feet.	Ammonia in Grains.
Aug. 1.	9·8	0·02
,,	8·7	0·02
,,	6·8	0·02
,, 2	8·0	0·02
,,	7·7	0·02
,,	7·9	0·02
,, 3	7·1	0·02
,,	8·0	0·02
,,	8·1	0·02
,, 4	7·7	0·02
,,	8·2	0·02
	78·2	0·02

Therefore $\frac{200}{78{\cdot}2}$ = grains of ammonia per 100 cubic feet of gas.

Thus, neglecting the first experiment, 78·2 cubic feet of gas contain 0·2 grain of ammonia, or 0·25 grain in 100 cubic feet. The first experiment is neglected because it contains a slight error—namely, the small amount of gas carried into the tube B. Therefore it would be better not to consider it as an individual reading.

In mentioning the volumetric solution, I stated that it should be made up at a temperature of exactly 60° Fahr., because, as I have mentioned before, dissociation of ammoniacal solution by heat is so marked that very exact results can be obtained only by working at uniform temperatures. The following is the difference I have found on an estimation of ammonia at different temperatures, and using methyl orange as the indicator—

50° Fahr.	0·1000 grain of NH_3.
55° ,,	0·1000 ,,
60° ,,	0·1000 ,,
65° ,,	0·1010 ,,
70° ,,	0·1020 ,,
75° ,,	0·1024 ,,
80° ,,	0·1032 ,,
90° ,,	0·1040 ,,

It will be observed that there is no practical change at low temperatures, but that change is apparent above 60°. Congo red is a good indicator to show these reactions. The methyl orange is the best indicator for use. Phenolphthalene and litmus are inadmissible, because the ammonia comes over largely as carbonate; and these indicators are not reliable under such circumstances. Sir William Crookes's colorimeter, for determinating shades of colour, might be used with advantage in fixing the point of neutrality.

In conclusion, I may mention that the principle enunciated here is applicable to many estimations—such, let us say, as to the carbonic acid. I have used divisions which I consider more scientific; but, of course, it is merely a question of transposing, if "septems" are preferred.

Mr. S. B. Langlands (Coleraine) said he desired to ask the members to accord to Professor Tichborne the heartiest thanks of the Association for the very able and clever scientific lecture he had given them. He should hardly call it a scientific lecture, in that it had not been composed of chemical symbols, or charged with French millimetres or centimetres. It had been simplicity itself; and he thought that when they studied it at home they would, if they acted upon it, have a very good guide in dealing with the estimation of the impurities referred to. He might say that if the absorption tubes shown were Professor Tichborne's own construction, he thought it was a very effective arrangement, and its action was sweetness itself.

Mr. C. B. Outon (Inchicore) said it was his privilege to second the vote of thanks. The subject-matter of the lecture, and the lucid manner in which the lecturer delivered it, had afforded him the heartiest satisfaction and instruction. He believed this feeling was shared by every member present.

The President said he had very much pleasure in conveying the thanks of the meeting to Professor Tichborne. Personally, he would like to see such lectures extended to all their Associations, if possible. He would also be glad if they could have engineering lectures at their meetings, in the same way.

Professor Tichborne said he was very much obliged to the members for the kind and hearty way in which they had received his lecture. It was sometimes rather hard for men in his position to fix upon a subject. But he thought the one he had chosen would interest them; and having regard, as the President had said, to the wonderful amount of opposition which was gradually creeping into gas supply, gas managers should apply themselves to these matters, with the natural result that residuals would go up in price, and become very important items of revenue to gas undertakings.

Mr. S. B. Langlands (Coleraine) read the following paper:—

NOTES ON BUILDING CONSTRUCTION IN SMALL GAS-WORKS.

My subject is one on which very little new light can be thrown, more especially by a tyro. However, I fancy that, in discussing my attempt, some of my colleagues in the profession may reiterate some accepted truths. As the author of "Dreamthorp" aptly puts it, "The world is not so much in need of new thoughts as that when thought grows old and worn with usage it should, like current coin, be called in, and from the mint of genius

re-issued fresh and new." That this rejuvenation may be accomplished by my brother-members, is my hope. My intention is to deal almost exclusively with what I may be allowed to call the "umbrellas" or coverings of our works—commencing with the coal-store and going beneath the other umbrellas as I proceed.

In the construction of a coal-store, ground of sufficient area must be covered to admit of the storing of at least four winter months' supply of coal; as in these times of strikes and other labour troubles, also when vessels are as scarce as they were last winter for the conveying of coal, many anxious minutes are ours if we arrive at our last 50 tons. Making the walls of the store of best hard-burned brick, 14 inches for the first 9 or 10 feet, and 9 inches for the remaining height of the building, is ample thickness; a buttress being placed outside every 15 to 18 feet. This buttress may be constructed in such a way as to give an artistic finish to the building, and is a saving both in labour and bricks. It makes a better and stronger job than if the walls are made thicker throughout. The roof having ordinary queen-post principals may be slated; the purlins being set at 10½-inch centres. Or if money is not too plentiful, corrugated-iron may be used; and this, if well put on and painted with red oxide each year, looks exceedingly well, and is not the eye-sore which æsthetic beings declare. Skylight frames may be made in the roof, and glazed with ¼-inch rough rolled glass. The floor should be made in such a manner as to be at all times perfectly dry, as spontaneous combustion is a resultant of damp. In the "JOURNAL OF GAS LIGHTING" recently a small paragraph advocated iron plates for flooring; but this and Caithness flags would be too luxurious for small gas-works. Ordinary fireclay bricks, after having been used in our retort-settings, if neatly cause-wayed, make an excellent floor; and, cheaper still, if a bedding of hard burned bricks broken into pieces of about 3 inches diameter is put down, and a tar and breeze covering put on, a floor of surprising quality is obtained, both as regards its durability and the ease with which shovelling can be done over it.

In the selection of a site for a retort-house, the nature of the subsoil should be carefully looked into, as although at the time ordinary settings of retorts are to be erected, at some future date regenerative systems may be wanted; and if, when excavations are commenced, water is found, it spells endless trouble if not cessation of the work. The foundations for all walls of the retort-house—yes, and for all buildings—should be very carefully put down, and excessive rather than scimped. For instance, an 18-inch wall, 20 feet high, should have a foundation 3 feet deep, with a breadth which would leave 1 foot of scarcement on either side. If the retort-house is to be built in brick, then 18-inch work should be carried to the height of the bench, and 14 inches above that—all built in English bond, with close key-drawn joints. The roof, we know, must be of iron and steel throughout, and the slates fixed to purlins with either copper-wire or lead nails. The nature of the principals being of necessity determined by the span of the roof, I cannot advocate any special arrangement thereof. However, no great space should be specified between them, as our roofs have many times to bear extraordinary strains; for it is a very common practice to place our new retorts in position in the ovens by means of a plank resting on the principals, with a block and tackle in the centre. For this reason I would also advocate a longitudinal tie-rod connecting them together, and affixed to wall-plates in the gables. A ventilator should extend along the greater part of the roof, and be constructed in such a manner as to allow all smoke, &c., to escape, and yet not to allow down-draughts of cold air. Plenty of daylight in the retort-house is not, I am afraid, a usual thing; in fact, one would think the window-tax was still in force from the dim religious nature of the light in many of these buildings. Why is this? In many cases, windows seem to have been almost entirely forgotten during erection; and what small glazed openings there are, are usually much in need of a rub. Now our deeds are not deeds of darkness; so henceforth admit light, and keep our retort-houses as clean and cheery as possible.

The exhauster-house may be a neat little building wrought in 9-inch brickwork, as the walls here have not to stand any strains. The roof to be wooden, and slated; with a revolving ventilator to it. A good deal of finish should be put on this little building, as it is one of the few which allow of this being done in a gas-works. The insides of the walls may be sheeted and varnished, and the doors glazed on the top half. A concrete floor should be put a few feet from the wooden floor level, so that all the connections may be at all times accessible. This lower floor should be made with a fall to a grating set therein, so that all condensed steam, oil, &c., from the engine may be led into the drainage system. The wooden floor should have an open-work iron grating, 6 inches broad, let in all around the base of the engine, so that oil spilled, &c., may get away.

The lime-store needs only to be well built, well roofed, and well ventilated. A large door must be made to allow the lime-carriage to enter and leave in its journeys to and from the purifier-house.

The purifier-house—to be Irish—must be no house at all, but only a roof supported on beams and iron columns. This question of closing in the purifiers has been discussed time and again; and although accidents have occurred, demonstrating the folly of completely closing them in, advocates are still to be found for this system. A beam should run along the whole length of the house, of sufficient strength to allow the purifier-covers to be suspended from it, and the lime-carriage to travel along when cleaning and recharging are being done. The ground around purifiers should be concreted, to allow it to be decently cleaned up after the emptying of a purifier.

The meter and governor houses should be finished similar to the exhauster-house; and the valves for the holders should be placed inside one of these houses.

I only want to speak of one or two small points ere I close. In the "daily round" a hundred-and-one things crop up to be noted; and if these notes were now and again given to us at these meetings, I fancy they would be more beneficial than deep lectures on abstruse subjects.

One of my notes is relative to my anxiety with a chimney stack. In the construction of the works, the stack was placed inside the retort-house walls; and in its oscillations it pushed the walls out all round it until at present a gap of a foot wide yawns between it and the east wall. As the chimney has become reduced to a mere shell of 4½-inch brickwork, it is to be taken down, and a new one erected on some vacant ground adjoining the works. Before the state of the chimney was discovered, I was busy speculating as to the best means of dissevering it from the walls, and had in my own mind determined to free all the walls from the chimney and make an apron of zinc work affixed to the stack, and extending over the roof, to throw off the water.

Again, the exhauster and meter houses had been built with very poor mortar; the joints were open and ugly. Well I put one of my men to work picking out all the joints, pointing them with cement, and key-drawing them all with a steel key, which I got made for the purpose.

In preparing the plans and specifications for one of my jobs I came on the following table, which may be of use to some of you in your constructional works: To find the number of bricks required in building certain lengths, &c., of walls. Take out the superficial area of all the walls in square feet, arranging them in groups according to their thickness—*i.e.*, so many square feet of 9-inch, so many of 14-inch, and so on. Then deduct the areas of doors and windows. Then multiply the areas so obtained by the following figures: If half-brick thick, multiply by 0·0053; if one brick, by 0·0106; if one-and-a-half bricks, by 0·016; if two bricks, by 0·0213: if two-and-a-half bricks, by 0·0267; and if three bricks, by 0·032. The answers will be the numbers of bricks required in thousands.

Discussion.

The PRESIDENT was afraid they could not all carry out their ideas; but it was good to have high standards before them, so that if they had the opportunity they might be able to do so.

Mr. J. NISBET (Portadown) remarked that he had a chimney built into the retort-house, and it bulged, with the result that they had to pull it down.

Mr. J. RICHMOND (Kilkenny) said he did not consider there was any necessity for having the retort-house roof of iron. He did not see any reason why it should not be of wood.

Mr. T. WHIMSTER (Omagh) suggested, as difficulties, that if there were shafting, probably the wall proposed by Mr. Langlands would not be strong enough; and that if they put concrete round the purifiers they would not be able to get at the pipes.

Mr. H. KIRKHAM (New Ross) said very few managers of small gas-works got what they wanted. He only wished he could get some of the things he would like. He recently had to take down a shed because he found that the steam had rotted away the galvanized iron roof. It was a coke-shed and he had put up a roof of wood, with felt. He knew the roof of wood and slate upon his retort-house was the best in the whole works.

Mr. B. WILLIAMSON (Clones) thought the chimney was often a difficulty in old works. He instanced a case in which one was part of the gable, and the gable part of the chimney; and it very nearly came down before they could get it pulled down. Anyone who put up a chimney which was not separate from the building would certainly have a collapse.

Mr. F. EUSTACE (Tullamore) said a sheet-iron louvre was placed on his retort-house eight or ten years ago. It recently required to be looked at, and they then found that a good deal of the copper wire work binding the slates on to the ribs required repairing. Nothing was holding the slates except a little cement. He should like to know what would be a good substitute. Lead nails had been mentioned; but he had not had any experience of them. He expected to have to ask his Directors in a year or two to put a new roof to the retort-house; and he wished to know what would be the best method of binding the slates, because he found that the acid acted upon the copper wire.

Mr. WILLIAMSON said he took down an iron roof, thirty-five or forty years old, and found it was, in point of fact, nearly as good as when put up. He was afraid that the copper wire of which Mr. Eustace had spoken must have been of inferior quality.

The PRESIDENT thought the copper must have been a little inferior. Where a retort-house was large enough, he would have no objection to an iron roof; but in a small house he thought such a roof was unprofitable.

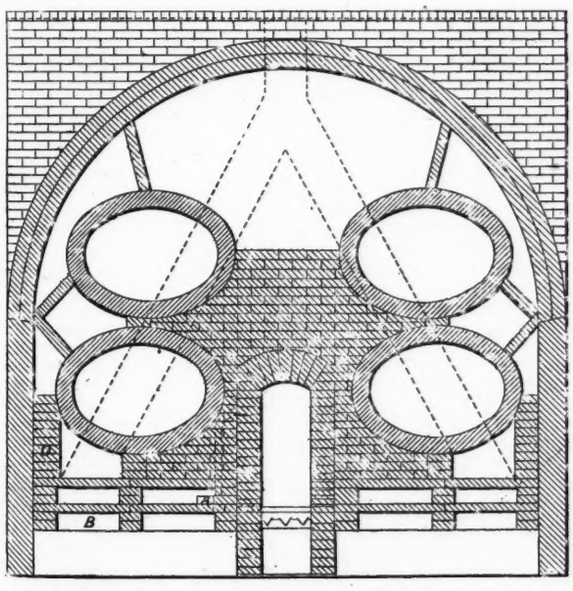
Mr. J. G. TOOMS (Carrick-on-Suir) said that at Waterford recently a roof was put over the sulphate of ammonia plant, and they used aluminium nails to fix the slates, with the idea that the foul gases would not rot the nails. Of course, they could scarcely do that in small works.

Mr. LANGLANDS returned thanks for the way in which the members had received his paper and discussed it. He thought that if they had had his trouble owing to a wooden roof over the retort-house taking fire, which it had done time and again, they would know which to prefer. He had seen twenty or thirty iron roofs, and he must say he preferred them to anything else. For putting slates on, he thought they should have lead nails 5½ inches long, 16 head, ¾ inch diameter, and bent round the end of the slate. They would observe that he did not speak of galvanized iron roofs for retort-houses; he kept away from that. His idea was to have cement 4 inches broad round the purifiers; and they would not mind it to that extent, seeing that it would enable them to have a thorough cleansing of the purifiers, which were not the cleanest things they had, after having been in use for some time. He had been troubled with his pumps getting out of order; and he procured an aluminium pump, which had overcome the difficulty arising from the action of the acid.

Mr. W. A. REID (Longford) then read a paper entitled—

THE WORKING OF A SEMI-REGENERATIVE SETTING.

Having had a few years' experience of a setting of retorts on the regenerative principle, I thought it might be of interest to my brother managers of small works to make some remarks thereon. Some six years ago, I got my Directors to consent to my removing two benches of threes, and erecting a new bench of fives 21 inches by 15 inches by 8 ft. 6 in. In due course the bench was erected; and I thought we would have smooth sailing and a profitable year. When the time came round that this bench was required, a fire was put under, and heat got up slowly. At the end of a week, however, the heat was not what it should be; and I tried everything I could think of to remedy matters. But try as I might, the heat would not get more than a dull red. We worked on in this fashion until the pressure of work made things unpleasant; and it was then that I thought of trying what tar-firing would do. Having one of Walker's tar and steam injectors at hand, I set it to work, and in a short time there was a great improvement in the heat, which enabled us to get over the busy season. Not wishing to put in another winter with the same setting, I was on the look-out for something better and more profitable; and at last I decided to erect the setting which is the subject of this paper.



During the following summer, I pulled down and cleared out the whole setting, and excavated below the floor-level about 3 ft. 6 in., and put down a good concrete floor, perfectly level, to within 2 feet of the ground-line. I then started from this floor to run up the air-channels, of which there are four on each side of the furnace walls. On the top of this air-chamber, the main flue was built, and the bottom retort placed in position. The furnace walls were carried up to the centre of the bottom retort, and in each of the walls were two nostrils conveying the heated air to the furnace. I should mention that the cold air passes in through an opening in the front of the bench at the floor-level and on to the bottom air-channel. Four arches are thrown over from side to side of the retorts, and rest on the top of the furnace wall. A single brick on flat is then laid on the top of the bottom retorts, from front to back; and the upper retorts are laid on this bed, and the walls between the retorts continued up to the level of the top retort—having the arches as their foundation. Single bricks on end are placed here and there between the retorts and the side of the oven, to give strength and to keep the retorts secure. A baffle-wall is built on the top of the retort, from the front to within 2 feet of the back wall. It consists of bricks or tiles on edge, and made tight so that no heat can escape direct to the waste-gas main flue until it first travels the entire length of the bed.

By reference to the drawing you will observe that the cold air enters at A, an opening in the brickwork at the front of the bench, 4½ inches by 2½ inches, and travels to the back of the oven; and crosses to B, and on to the front of the bench. The air then rises to the next channel, and on to the back; crossing over, and on to the front. It is then conducted by two small passages to the furnace, where it unites with the furnace gases and generates an intense heat, which rises to the top of the arch, and there disperses evenly round the retorts. The baffle-wall does not let the heat away too quickly, but compels it to travel to the back of the oven, where it crosses over the upper retort, down the sides, and on to the front, at D, into a wide flue under the bottom retort, and then into the main flue.

I do not know that I can say more about this setting, further than mention that it has been a great comfort to the men and myself, and a great source of profit to my Company. Saturday being our heaviest night, the men had formerly to work if anything harder on Sunday than other days of the week; but with this setting, they can get six hours off on Sunday, which in itself is a great matter.

With regard to the furnace, I have three angle-bars, 4 ft. 6 in. long, resting on two metal cross-bars, with V notches to hold the bars in their place. A small iron pipe conveys water to the bars, which is constantly running down them. As the bars are 3 inches lower at the back, the water runs the entire length, and keeps them cool; and also prevents the clinker from becoming hard. There is thus no trouble in cleaning out the furnace, which takes place every second day in winter and every third day when the work is lighter. The ash-pit is large and deep, so as to hold a quantity of water; and, of course, it must be rendered water-tight.

This setting takes a very small quantity of coke to keep up the heat, as compared with the former settings I had. To fill the furnace requires 2⅓ cwt. of coke each time; and the furnace is filled four times in the twenty-four hours.

I do not claim anything very original in this setting; but for managers of small works I do claim that if they adopt a setting on the principle I have tried to explain, they will add to the revenue of their companies, to their own credit, and last (but not least) to the comfort of their men.

Discussion.

The PRESIDENT said he trusted that Mr. Reid's paper would bring out a good discussion, and that members would speak their minds fully on the matter dealt with.

Mr. J. LYNE (Wexford) asked Mr. Reid to explain where the secondary air entered, and where it met the gas and the combustion took place.

Mr. REID gave the explanation on the diagram, and said the whole system was very simple, and was easily worked.

Mr. TOOMS thought there was something wanting in the paper. He wished to know what was the make of gas per mouthpiece per 24 hours.

The HON. SECRETARY said he had no experience of regenerative furnaces, or even of such a system as Mr. Reid had shown them, because in his place they could not drive a yard steel bar into the ground without getting into water; but he believed in a secondary air supply, even with ordinary furnaces. He put in three ovens of six retorts each, on the ordinary system; but he had very unsatisfactory results. He found that he could not get anything like a heat out of the lower retorts on each side of the furnace; and it seemed to him to be foolishness to charge them. He took them out and put in a secondary air system; and he found that by this system he could get far more gas out of the four retorts than he had formerly done out of the six. He was not prepared to give the figures, because he did not think of speaking on the subject; but his plan was a very simple one. His retorts were ∩ shape. The main outlet-flue went along on the ground level. By taking away the bottom retorts, he had room for double flues; and he got all the heat for the secondary air from the waste gases after they had done their work in the oven. It was an easier mode of heating, as well as more regular and stronger all over the setting; and he could work off more coal in the time.

Mr. LANGLANDS offered his thanks to Mr. Reid for his able and clever paper. He would be pleased, however, if the author would give them plans—sections as well as elevations—of the setting. He did not know if he was right in saying Mr. Reid spoke of allowing cold water to run down the bars of the furnace; but, if so, he would suggest that putting steam there, instead of cold water, would be better.

Mr. KIRKHAM said he should like to get full particulars of the size of the flues, because he found that in a setting of fours, somewhat on the same style, the flues clinkered up, and the process was simply useless.

Mr. R. HARRISON (Wicklow) remarked that two years ago he put in a setting of threes, somewhat the same as this one, and last year one of fours, and he found he got more gas out of the former than from the latter. The only difficulty he had was in the putting in of a piece which dropped clean out of one of the flues.

The PRESIDENT said he had had the pleasure of using one of these settings. His floor was not the same, because the bottom of his retorts was very low, and he had to go underneath.

He found that the heats went down, more or less, after clinkering; but he thought this was rather on account of having to stoke up with cold coke. He was having a small barrow made, so that the furnace could be charged with hot coke. He did not think it would be a fair criterion to simply state the quantity of gas made per mouthpiece, without giving the size of the retorts. Many of them had retorts 8 feet, and others 10 feet long. He was strongly in favour of the latter, because there was always about 2 feet at the mouth in which they could not get the heat up.

Mr. REID said he could not exactly state the quantity of gas made per mouthpiece per 24 hours, but his average make during the twelve months was 10,200 cubic feet per ton of coal. He thought this was a very fair return, considering the works were small ones. In the first year of his working the system, there was a closing up; but in the second year he raised the air-holes and kept the coke away from the entrance, because it was the air rushing through the coke that created such a heat that the bricks were melted. The setting had worked for nearly three years. He had no fractures at the air entrances, because he made certain that the cold air would not strike upon any part of the setting unless at the nostril. They had made an extra profit of between £80 and £90 a year by the process; so that it spoke for itself.

Differential Rates for Gas.

The HON. SECRETARY, in the absence of the author, read a paper by Mr. R. B. Anderson, of Westminster, entitled "In Favour of Differential Rates for Gas." This, with the discussion thereon, will be given next week.

Election of Office-Bearers.

The HON. SECRETARY intimated that the Committee had been put in rather a dilemma by the receipt of a letter from Mr. G. R. Love, of Dundalk, who, in the ordinary course, would have been proposed as President, declining to be nominated. After considering the matter, the Committee recommended that Mr. C. B. Tully, of Sligo, be elected President.

Mr. A. MACKENZIE (Edinburgh) moved, and Mr. T. FRIZELLE (Holywood) seconded, Mr. Tully's election; and the motion was unanimously agreed to.

Mr. TULLY thanked the members for the honour they had conferred upon him in making him President of the Association. He said he would do all he could to make his year a success, as well as to benefit the gas business in Ireland.

Mr. W. A. Reid (Longford) was elected Vice-President, on the motion of Mr. LANGLANDS, seconded by Mr. WHIMSTER.

Mr. J. Whimster (Armagh) was re-elected Honorary Secretary and Treasurer.

Messrs. W. Nisbet (Monaghan), Fred. Eustace (Tullamore), T. Llewellyn (Newbridge), and J. G. Tooms (Carrick-on-Suir) were, on the motion of Mr. MACKENZIE, seconded by Mr. J. BAIN (Glasgow), elected as members of the Committee.

Place of Next Meeting.

Mr. TULLY invited the Association to meet next year in Sligo; and this was agreed to unanimously.

The Name of the Association.

The PRESIDENT said it had been mooted to him that it was perhaps desirable to alter the name of the Association. A good many southern gas managers had come into the Association, and there seemed to be a consensus of opinion that they should have a title which would represent the whole of Ireland.

Mr. EUSTACE and Mr. LANGLANDS gave notice that at the next meeting a motion would be made that the name of the Association be altered to some such one as "The Association of Gas Managers for Ireland."

Presentation to the Hon. Secretary.

The PRESIDENT said the next duty he was called upon to discharge was one which gave him considerable satisfaction and pleasure—he referred to the presentation to the Hon. Secretary, Mr. Whimster. As President of the Association, he was glad it had fallen in his year of office to have this honour; but, on the other hand, he was doubtful of his ability to adequately voice the sentiments of the various subscribers to the testimonial. He thought if he could have shown Mr. Whimster the letters he had received from the different members, with the generous response to his circular, and the kindly good wishes expressed, it would have gladdened him more than any words could possibly do. And what would still more have pleased him, those who had known him longest and best were the most enthusiastic in recognizing his many excellent qualities as an individual, and his unwearied services as Secretary and Treasurer of the Association. After his (the President's) experience during his year of office, he was not surprised at this. Very few of the members could imagine the onerous duties the Secretary had to discharge, or the amount of labour that was involved in working up a meeting such as they had had that day. The Association was started some twelve years ago, on the initiative of Mr. Whimster; and ever since he had acted the part of the "Guardian Angel" with a success that every gas manager in Ireland recognized. This success was largely due to Mr. Whimster's genial manner, his kindly nature, and his sterling straightforward character. Most Gas Associations recognized the desirability of combining these qualities in their Secretaries, on whom so much of the success of the societies depends. He (the President) well remembered joining the North British Association, when Mr. Terrace was Secretary, and how his heart warmed to him for the kindly interest taken in him, and for the encouraging words spoken to him as an utter stranger. Again, when he joined the Gas Institute, Mr. Hepworth at once gained his loyalty and respect by his courteous and unpretentious manner. It would be seen, therefore, how much of the success of such societies depended on the Secretary. The President was only in office for one year, and then had little or no further responsibility. The Secretary, however, was more or less permanent; and it was on him that most of the anxiety and labour devolved. Mr. Whimster had the interest of the Association at heart, and had done much for it. He (the Speaker) often thought how few kindly words men spoke to each other, but instead how they carped and criticized. If only they would show their better natures to their fellow creatures, how much brighter this world would be. It must therefore be very gratifying to Mr. Whimster to find his services so much appreciated. As concerned the Committee, it had been a pleasure for them to work up this testimonial—the members, almost without exception, showing such a hearty co-operation in the movement. It gave him very great pleasure to make the presentation to Mr. Whimster, on behalf of the Association [handing over a purse of sovereigns]; and he felt sure the members would all endorse his words when he expressed the hope that he and Mrs. Whimster would enjoy good health for many years to come, and that he would long continue to give the Association the benefit of his valuable assistance as Secretary and Treasurer.

Mr. WHIMSTER, in acknowledging the gift, said that when the Association was launched in 1887, it was purely an experiment. It was considered that such an organization was wanted; but in Ireland gas managers were so few and so widely scattered, that no one could foretell the result. The justification of the experiment was to be found in its success. Every meeting had been usually considered more successful than the former ones, and the present one had been no exception. The success had not depended on the number of prominent men, of large experience and having control of large works, but rather on the number of working managers, men who had to do the work, and grapple with the difficulties themselves, and who had met together and exchanged experiences—learning from one another how to meet the petty difficulties and worries of their every-day work. Of course, keeping abreast of the times, and studying the brilliant advances being made in the high places of the profession, had not been neglected by them. Thanks to Professors Macadam and Tichborne, who had so kindly placed their skill and learning at their disposal, they had usually had matter suited to all tastes. It spoke volumes for the value of their annual gatherings when men were found ungrudgingly bearing the expense and inconvenience of attending them from such distances as to involve one and even two nights from home, and who, he was sure, would never have thought of doing so for a mere holiday. Apart from papers, however, he believed the Association had justified its existence by bringing men of the same profession—necessarily isolated—from all parts of Ireland, into touch with each other; and the annual re-union, the friendly hand-shake, and the congenial "shop" talk with an intelligently appreciative companion, were often as good and helpful as the more formal paper and discussion. He had sometimes thought that an informal meeting—beginning with a Chairman's address, followed by a free-and-easy conversation on any and every topic of interest to those present, and closing with a scientific lecture—would be a valuable deviation from the regular routine, and worth a trial. He wished particularly to thank the members most sincerely for their handsome expression of appreciation of his services as Secretary, which it would be pedantic to pretend to regard as given in any other than a friendly—even brotherly—spirit.

A Case for Benevolence.

Mr. TULLY said he was very sorry to inform the members that Mrs. Salmon, the widow of their late President, Mr. Salmon, of Galway, was not in very good circumstances.

It was agreed that a circular should be issued to the members of the Association, asking subscriptions on behalf of Mrs. Salmon and her family, and that the Committee be empowered, if they should see fit, to make a contribution out of the funds of the Association.

Votes of Thanks.

Mr. TULLY moved a vote of thanks to the Corporation of Dublin, and to Mr. Thos. J. Cotton, the Inspector of Lighting for the City, for the use of the City Hall.

Mr. COTTON acknowledged the vote.

The HON. SECRETARY moved, and Mr. LANGLANDS seconded, that the Association record their appreciation of the very able and valuable services of their worthy President, Mr. Auchterlonie, who, he (Mr. Whimster) was sure, had conducted the business of the day in an admirable manner, and who had been in every way a model President.

The PRESIDENT returned thanks, and the meeting concluded.

During the mid-day adjournment, the members paid a visit to the brewery of Messrs. Guinness, Son, and Co., where they were shown over the establishment, and were hospitably treated.

In the evening, the Association were entertained to dinner in

the Gresham Hotel, Sackville Street, by Mr. C. S. Spear, of Dublin. Mr. Spear presided over a company numbering about fifty. After dinner an enjoyable smoking concert was held.

On Wednesday, an excursion took place to Bray and the vicinity, in brilliant sunshine. The party travelled by rail to Bray Station on the Wexford Railway. Thence they travelled in coaches by the rocky glen to the Powerscourt Waterfall, one of the prettiest in the United Kingdom. On the return journey, they drove through the Powerscourt Demesne, the natural and artistic features of which were much admired. After dinner, in Miller's Leicester Arms, at Enniskerry, the company walked down the Dargle Glen, a scene of great grandeur, and, reaching Bray about five o'clock, took tea in the International Hotel. There was then time for a stroll upon the esplanade, which terminated probably the best outing the Association have ever had, and one which it is in the power of few Associations to make.

REGISTER OF PATENTS.

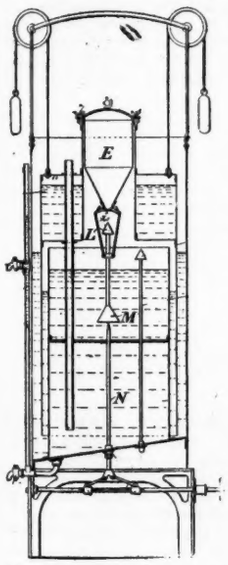
Heating and Ventilating Apparatus.—Thompson, W. P.; a communication from the American Incandescent Gas Company, of Kansas City, U.S.A. No. 14,823; July 5, 1898.

This invention relates to a heating and ventilating system embodying the use of gas as a heating medium, and of air and water to absorb and distribute the heat. One object of the invention is to employ a system of radiators throughout the different rooms or portions of a building, and so connect them with a source of supply of gas that they may all be regulated from a common point; another object is to make a combined hot-air and hot-water radiator, in which gas is used as the heating agent; and a still further object is to simplify the construction of the radiator sections, so that they may be readily assembled.

Acetylene-Generators.—Williams, R., of Edgbaston, and Clarke, J. H., of Brompton Square, S.W. No. 16,479; July 28, 1898.

This invention relates to acetylene-generators in which the calcium carbide is dropped in regulated quantities into water; and part of it relates to the valve arrangements necessary for liberating the carbide, and part to the general arrangements of the generator.

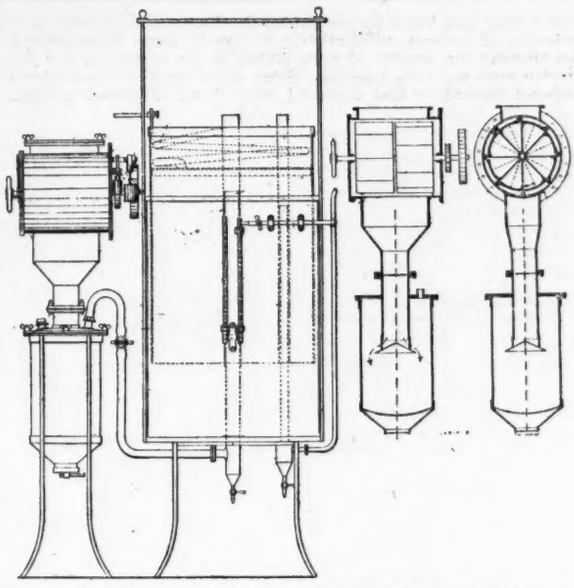
An illustration is given of one form of the apparatus. The space between an outer cylindrical vessel and an inner vessel contains water which forms the seal of a gasholder or bell; the inner vessel containing the water which is to act chemically upon the carbide. The water of the seal is thus kept separate from the water which acts upon the carbide; and it is possible to clear out the lime and discharge the water from the inner vessel, without allowing gas to escape from the holder. The top of the holder is provided with an upwardly projecting cylindrical part, which supports a vessel E containing the carbide, and terminating at its lower end in a conical hopper. This consists of two flaps hinged upon opposing edges of the discharge aperture of the vessel, and provided with sharp edges or lips, meeting together so as to cut through any carbide which might otherwise prevent their proper closing. The flaps are provided with opposing levers actuated from a central rod by connecting links attached to a collar. The rod carries at its upper end (beneath the flap valve) a sharply-pointed cone L, which serves to distribute the carbide in its fall into the water, and at its lower end, a conical weight M, which keeps the valve closed. When the gasholder falls, the weight comes into contact with the top of the rod N, and the carbide valve is opened, allowing carbide to fall into the water in the inner water-vessel. A quantity of acetylene is thus generated, which causes the bell to rise, taking the weight M out of contact with the rod N. This weight then brings the flaps of the valve hopper together, and so shuts off the supply of carbide.



Acetylene Gas Producer.—Varon, J., of Bordeaux. No. 16,884; Aug. 4, 1898.

This acetylene-generator includes three main parts—the automatic carburet distributor, shown in elevation and cross sections; the generator proper; and the actuating gasholder.

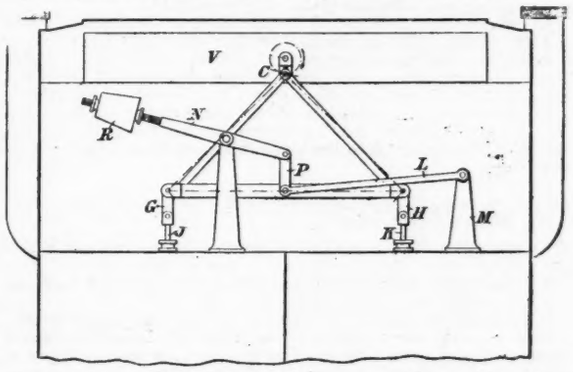
The carburet distributor is housed within a horizontally arranged cylindrical casing, and is composed of two (or more) troughs or bucket-wheels mounted on a common shaft. A ratchet-wheel is placed on the shaft and actuated by a pawl or dog pivoted on a lever, which is engaged by a horizontally projecting rod, or an extension on the gasholder as the same is moved downward. There is a toothed wheel wedged on the shaft and serving to lock it, so as to prevent any accidental discharge of carburet. A hand-wheel on the shaft rotates the distributor for refilling; while an index on the shaft, moving in front of a dial on the end-plate of the cylindrical casing, indicates the troughs or buckets employed. An electric circuit, having contacts on the index and on the last numeral of the dial, is provided to notify the workmen that the distributor is empty. Moveable shutters are fitted to the troughs or buckets containing the carburet. A rectangular box is secured to the lower part of the casing, and, extending downwards, has a tapered part, to which is secured a cylindrical conduit, on which is arranged a carburet-dispersing cone at the lower end.



The gas-generator is arranged beneath the distributor; and the gasholder, adjacent to the generator, is constructed so as to force the produced gas to flow through a condenser coil on top of the holder before being discharged into the latter—the inflow and outflow pipes being provided with the necessary relief-cocks.

Gas-Meters.—Rhodes, E., of Leeds. No. 18,328; Aug. 26, 1898.

The patentee aims at overcoming the "dead-points" that at times interfere with the due action of dry-meter mechanism. He employs a triangular frame, the apex of which is carried on an adjustable pin C in the crank on the valve-shaft, which latter passes through a stuffing-box into the valve-box V of the meter. The lower angles of the frame are connected by links G H with the piston rods J K of the measuring chambers; and the movement of the frame is controlled by radial links L, fulcrumed on a bracket M on the framework of the meter, and to the base of the triangular frame. The weight of the moving parts is balanced by a weighted lever N, one end of which is joined to the frame by a connecting link P, while the other end carries a weight R, which may be adjusted in position to suit the requirements of the meter.



When the meter is at work, the pistons are set so that one is at or about half-a-stroke in advance of the other; and the dead-points of the crank-pin C are overcome by the rocking of the triangular frame at these points. This rocking motion is caused by one of the piston-rods being at the end of its stroke, and thus being used as a fulcrum for the other piston-rod. When the crank-pin is at a suitable angle with both the positon rods J and K moving together, the triangular frame "is moved bodily up or down, as though it were a common connecting-rod for the two piston-rods."

Prepayment Meters.—Hawkyard, J., of Saddleworth, and Braddock, J., of Oldham. No. 18,406; Aug. 27, 1898.

This invention relates to an improved form of the prepayment meter referred to in patent No. 14,655 of 1890, "so as to render it more direct in its action, and less liable to fraudulent use."

Fig. 1 (p. 430) is an elevation of the meter; fig. 2, a plan; fig. 3, a side elevation, partly in section, showing the valve and its seat; and fig. 4, a section through the line X Y in fig. 2.

The coin carrier or receiver A rotates on a spindle provided with a through slit for the reception of the coin, which is prevented from going too far by two stops set at the correct distance to sustain a coin of the required size, but which will permit any smaller coin to pass through. The coin receiver is rotated from outside by a milled wheel, preferably to about half a revolution. The receiver is so formed that the coin, when carried by the receiver, projects into the space in the wheel G. The valve C (which is supplementary to the valve usually employed) is mounted on the end of a spindle capable of both endwise and rotary movement; and is carried in bearings formed in the framing and passing through a stuffing-box, whereby any escape of gas is prevented when the valve is open.

Upon the valve-spindle is loosely mounted a delivery-wheel E, formed

with a long boss borne (as shown) by the frame of the meter, and projecting at the front sufficiently far to carry the finger D traversing a dial showing the number of coins placed in the apparatus, and for which no gas had been supplied. Some of the teeth of the wheel are projected forward, so that a small L lever F can be pivoted to them.

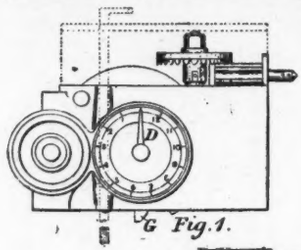


Fig. 1.

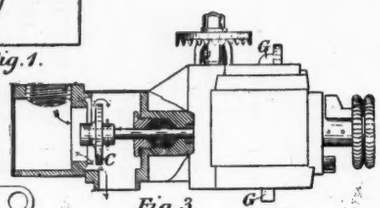


Fig. 3.

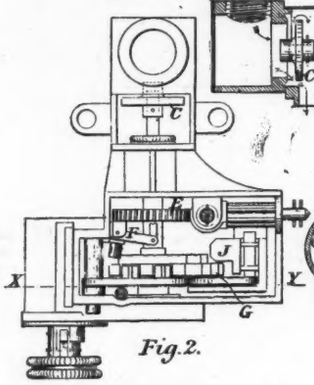


Fig. 2.

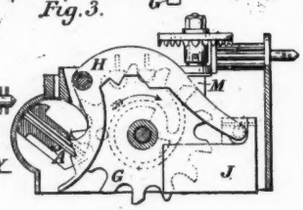


Fig. 4.

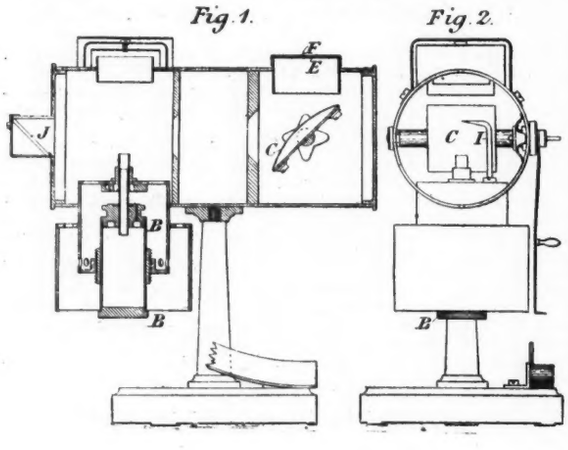
One end of the lever F is provided with a small anti-friction roller; and presses against a cam face formed in the inner face of the sprocket wheel G. This purchase-wheel is loosely mounted upon a boss, and is kept in position; and as it has on the side opposite the collar a boss in contact with a face formed on the front frame, it is prevented from having any longitudinal movement. A lever H is provided having two arms. The horizontal arm carries on a pivot a weight J, the object of which is to keep in position, in two of the gaps formed in G, two detent catches which normally lock the mechanism. The vertical arm of the lever H has formed upon its face next the coin receiver two inclines; and at its lower end it is bent at right angles, so as to form a pin or detent passing across the face of the purchase-wheel G.

The delivery-wheel E is geared to the meter as described in patent No. 9771 of 1893. This arrangement consists of a vertical worm spindle M, which has fixed upon its upper end, by means of a nut, a readily changeable crown-wheel. The downwardly-projecting boss has a slot formed in it, which engages with a pin passing through M and projecting on each side of it. A shoulder is also formed on the spindle, which fixes its vertical position, and thus ensures it being in correct gear with the long pinion connected to the meter-index mechanism in any well-known way.

Illumination Photometer.—Crawley, C. W. S., of Red Lion Street, E.C. No. 19,087; Sept. 7, 1898.

This apparatus—for the purpose of measuring the illumination of a street, room, or other place—consists of a box or tube (supported by a pillar) containing a lamp, candle, or other similar standard B, which illuminates a small white or coloured surface C at the other end of the box. The surface is capable of rotation, by means of an outside handle, in such a way as to vary the angle at which the light from the standard falls upon it, and thus vary the illumination. Above the surface is another white or coloured surface E; and the instrument is placed so that this second surface is at the spot the illumination of which is to be measured. In this upper surface or screen is a small hole or slit F, through which the surface of the lower screen can be seen.

If the illumination of the upper screen is greater than that of the lower one, this spot appears dark; but if the illumination of the upper screen is less than that of the lower one, the spot appears bright. The



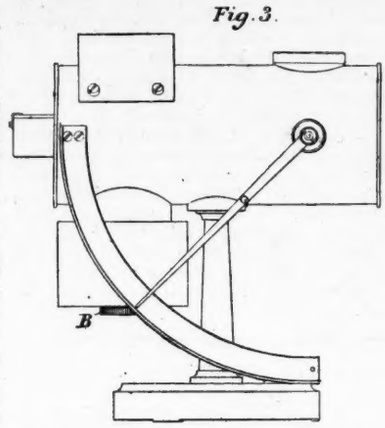


Fig. 3.

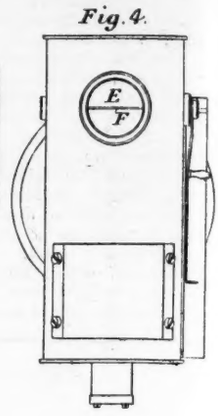


Fig. 4.

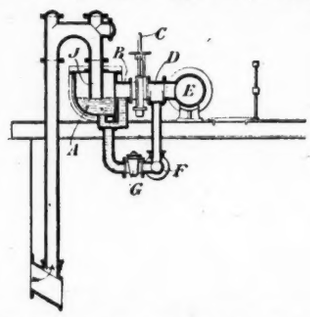
illumination of the lower screen is then adjusted (by operating the handle) until the spot appears neither bright nor dark, but of the same illumination as the rest of the screen, and the illumination of the upper screen is equal to that of the lower one. Attached to the lower screen is a pointer moving over a scale calibrated in terms of any convenient unit. Then, when a balance is obtained, the illumination of the surface to be measured can be read off in terms of this unit.

As a standard lamp, the patentee prefers to use an amyl-acetate one of any convenient form; and to regulate it by bringing the point of the flame up to a given fixed point I inside, which can be read from above by means of a mirror J in the side or end of the box. The light from the standard lamp is usually more yellow than the lights illuminating the surface to be measured—making it somewhat difficult to get a balance; but in order to obviate this difficulty, the lower screen may be tinted slightly with blue, or (which produces the same effect) the upper screen with yellow.

Hydraulic Mains of Inclined Gas-Retorts.—Drake, J. A., and Marsland, J. S., of Ovenden, Halifax. No. 19,361; Sept. 12, 1898.

The patentees propose to transfer the hydraulic main and connections on to lower girders in front of the retort-bench, thereby shortening the ascension-pipes and bringing the hydraulic main nearer to its work or near to the mouths of the retorts—"thus with lowering the position of these parts the ascension-pipes do not get blocked up as soon as formerly."

In the illustration, A is the hydraulic main; B, the gas and tar outlet box; C, the hydraulic main or weir valve; D, the tar catch-box; E and F are the gas and tar mains respectively; G is the sludge cock.



When it is found necessary to clear the hydraulic, the sludge-cock is opened; and the contents of the main pass into the tar-pipe. This ensures the heavy matter being taken out of the bottom of the hydraulic first, whereby a light seal is always left, on the dip-pipe J. By this arrangement, the patentees claim that they are enabled to obtain an increased amount of gas from each inclined retort, by reason of the hydraulic being much closer to the mouths of the retorts than hitherto. The hydraulic is also kept much cooler by being removed from the position it usually occupies over the retort-bench. There are several other advantages claimed for the arrangement—such as shortening the length of piping required, whereby the retort mouthpieces have less weight to carry; and generally the apparatus is more convenient and accessible for repairs and alterations, while the cost is reduced.

Automatically Shutting off the Gas Supply to Premises in Case of Fire.—Nobes, G., of Stoke Newington, N. No. 23,686; Nov. 10, 1898.

This apparatus for automatically shutting off the supply of gas in case of fire consists in the combination of a plug-cock with a conical plug fitting a chamber filled with semi-fluid material (such as tallow or vaseline), and a diaphragm rendering the same gas-tight, with or without a spring. The plug is suspended by fusible wire, and so is capable of falling to its seat on being released—a weighted rod assisting to make a complete closure.

Coin-Freed Gas-Meter.—Lake, H. H.; a communication from P. C. Shaffer, of New York. No. 26,541; Dec. 15, 1898.

This invention relates to a gas or liquid vending machine to be used in conjunction with an appropriate meter; the valve of the machine governing the escape of gas or liquid being opened by mechanism actuated by a coin, and closed automatically by mechanism actuated by the ordinary meter mechanism.

Fig. 1 is a plan of a gas-meter showing the meter mechanism and the vending machine attached thereto. Fig. 2 is a front view of the vending

machine with the front of the case removed. Figs. 3 and 4 are vertical sections. The various parts are shown in the position they occupy when the gas is about to be cut off.

Fig 1

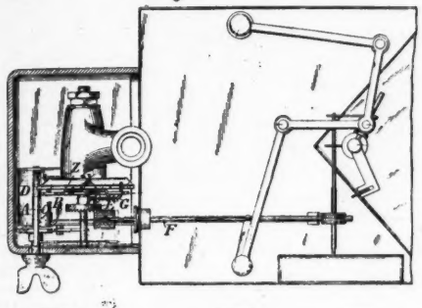
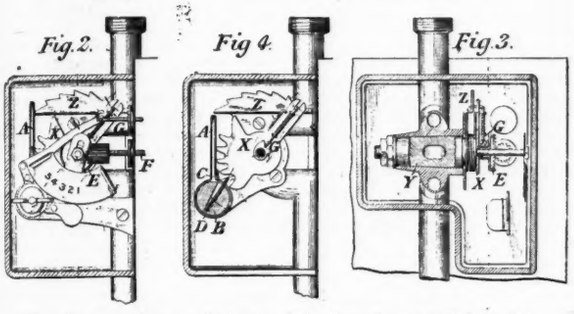


Fig.2. Fig 4. Fig.3.



When in operation, a coin is placed in the coin conduit A, and thence delivered into a V-shaped cavity in the rotatable coin receptacle B; the edge of the coin slightly projecting as shown in fig. 4. On the outside of the coin conduit a trap or door C is hinged, adapted to close the aperture left in the wall of the conduit for the passage of the projecting edge of the coin. The receptacle is encased in a stationary shell D, which has a portion cut out in such manner as to prevent the withdrawing of the coin except at the place of receiving and delivering it to the cash receiver of the machine. The coin receptacle (mounted in suitable bearings) is provided on one end with a ratchet wheel and gravity pawls, allowing it to be rotated in one direction only. The stem of the receptacle projects through the outer case of the machine, and there carries a handle by means of which it is rotated.

A crown wheel E, revolved by the meter mechanism when the meter is working, by means of a pinion secured to the shaft F, serves to regulate the quantity of gas to be delivered for a coin; one revolution of the wheel corresponding to the quantity of gas to be delivered for a coin. The wheel E carries on its back a pin which, at the end of each revolution of the wheel, raises the spring latch G, which is mounted in bearings secured upon one leg of the principal working lever X by means of a cam. The lever X is secured to the valve-stem of the inlet-valve Y, which regulates the gas supply; the broad segmental leg being provided with notches, all of which (with the exception of the first) are equal. The tooth of the first notch is longer than the others, in order to afford greater bearing surface to engage with the coin, and thus throw the latch G over the first long tooth on the track Z. The coin receptacle, with the projecting edge of the coin acting as a tooth or finger, will engage one of these notches and cause the lever X to oscillate, and thereby open the inlet-valve Y, until the spring latch attached to the other leg of the lever slips behind some teeth cut into the upper edge of the stationary rack mounted on the frame of the machine. One coin is required to advance the lever X one tooth, and, in turn, each revolution of the wheel E will raise the latch, and the leg will slip back to the next tooth on the rack Z, gradually closing the inlet-valve Y.

Corresponding to the first large notch on the leg of the lever X are teeth on the rack Z, the combined length of which is more than the length of any one of the remaining teeth. This is so that the first coin inserted will open the valve wide enough to permit a full supply of gas to escape. When the amount of gas paid for has been nearly consumed, this tooth will raise the latch G over the other tooth and snap back, so as to partially cut off the gas. When the entire amount of gas is consumed, another tooth will raise the latch so that it may snap to its resting place and close the valve Y.

In this machine, it is possible to place five coins or less in the receptacle successively; but if the operator should endeavour to remove any coin inserted through the coin conduit, the trap or door C will prevent it—a knife edge cutting any string which might be attached to an inserted coin.

Incandescence Mantles, Filaments, &c.—Boult, A. J.; a communication from A. M. Plaissetty, of Paris. No. 63; Jan. 2, 1899.

This is the invention referred to, in some detail, by Professor Lewes in the course of his lecture to the Institution of Gas Engineers last May. Referring in general terms to his proposal, the patentee says in his specification: Nitrates, azotates, and similar compounds obtained by the combination of rare earths or metals, such as thorium, lanthanium, zirconium, cerium, erbium, silver, platinum, &c., either alone, or mixed together, and heated to a high temperature, become decomposed into oxides, and, owing to the contraction that they undergo under the influence of heat, give, under the action of a flame from a bunsen burner, a powerful light; and by the application of the process to be described, a considerable economy of gas, as compared with that used in incandescence gas-burners hitherto used, is effected.

The process is chiefly based on the transformation of these nitrates or azotates into the state of oxide before the incineration of the mantles; thus doing away with the preliminary burning off by blow-pipes in order to remove the water which the constitutive filaments of the mantles contain, before the denitrification of the pyroxyl mixed with the nitrates or azotates in the shape of baskets, sets of threads, ordinary mantles, single threads, &c., so that "the very fact of submitting, for the first time, the lighting body thus constituted to the action of the burner, causes the instantaneous disappearance of every organic impurity, and an instantaneous production of incandescence—resulting in an intense light, the colour of which may be varied according to the nature of the salts or mixtures of salts employed."

In the practical application of the process, filaments are used made of a syrupy solution of "incandescence" salts mixed with collodion, consisting of nitrocellulose or pyroxyl dissolved in crystallizable acetic acid, acetone, &c., and transformed into oxide filaments by denitrification by means of hydrated sulphate of ammonia or calcium. The transformation is effected after having submitted the filaments in a water bath for several hours, and dried them at a temperature of 150° to 175° C. for four to five hours. The filaments thus transformed into oxide no longer require the long and expensive operation of incineration or calcination by means of a blow-pipe as with ordinary incandescence mantles; an ordinary burning off for a few minutes on any bunsen burner, or even on an ordinary burner, being sufficient to make them ready for producing an incandescence light. In this way, mantles can be supplied in a flexible and not fragile state; their fragility being only produced by the burning off for the purpose of rendering them ready for use. But, once burnt, the filaments do not undergo any contraction under the action of the flame of the burner on which they are used, as only the organic impurity has to be removed; while the rare earths are in the state of oxide, owing to the denitrification of the pyroxylin after the spinning or manufacture of the mantle, and a light equal to that of azotates or nitrates transformed into oxide according to the burning processes hitherto known is obtained.

Fig.1. Fig.2.

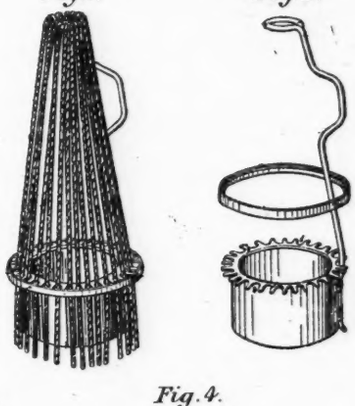


Fig.3. Fig.4. Fig.5.

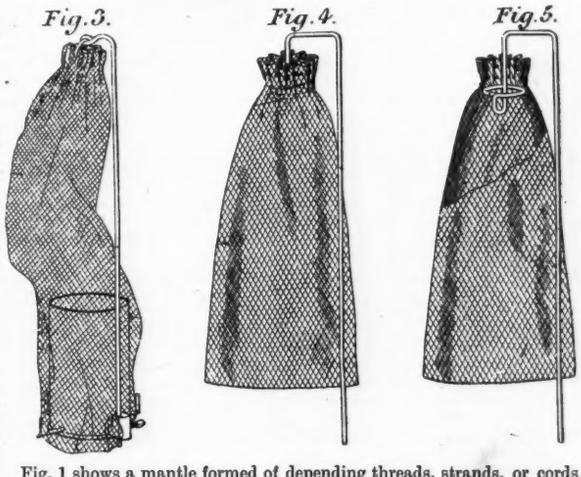


Fig. 1 shows a mantle formed of depending threads, strands, or cords constituted by filaments made from the above-mentioned syrupy solution of "incandescence" salts, mixed with collodion—consisting, say, of nitrocellulose or pyroxyl dissolved in crystallizable acetic acid, acetone, &c., and transformed into oxide filaments by denitrification by means of hydrated sulphate of ammonia or calcium; the transformation being effected after having soaked the filaments for several hours in water, and dried them at a high temperature. These threads or strands are supported by their hooked portions on a ring forming the upper end of a rod or bracket, the lower end of which is placed in a sheath or projection on a socket, which serves to secure the mantle and its support over the burner. The threads are uniformly distributed around the socket, and held in position by each of them being placed in a corresponding notch made in the upper edge or flange of the socket, which edge is perfectly horizontal and projects outwards—as clearly indicated in fig. 2. The retention of the threads in the notches may be completely ensured by a ring, which, after the threads have been put in place in the notches, closes the latter, and so secures the threads against lateral displacement.

The invention may also be applied to mantles of ordinary shape. In this case, as in fig. 3 (in which the mantle is shown in its uncontracted condition), a socket forms the bottom support or guide for the mantle, which is secured in the usual manner to the bent end of a supporting-rod; so that the lower portion of the mantle surrounds the socket, which is sufficiently high in order that, under the action of the flame from the

burner used for lighting, the lower edge of the mantle should be always maintained and guided by the socket until the completion of the contraction produced by the burning. The socket preferably comprises, besides (suitably arranged on its surface at the bottom), radial branches or projections on which the mantle rests, before the burning operation takes place, by its lower edge; so that, not being able to pass beyond the lower edge of the socket, the mantle cannot under the action of the flame contract under the edge. This avoids the breaking of its filaments at that point.

Again, as regards mantles of ordinary shape (figs. 3, 4, and 5), the patentee finds that the chances of their breaking is diminished to a great extent by employing a ring suspender as shown, in place of the ordinary asbestos cross-thread. This ring may be formed in any suitable manner at the end of the supporting-rod; and it ensures "a rational disposition" of the weight of the mantle over the whole of its head, and considerably decreases the chances of breakage.

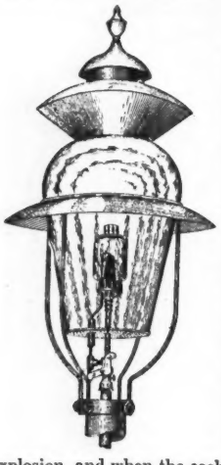
Manufacturing Calcic Carbide and Illuminating and Heating Gases.—Eldridge, H., Clark, D. J., and Blum, A. A., of Galveston, Texas, U.S.A. No. 9156; May 1, 1899.

This invention relates to an electro-chemical apparatus designed for producing calcium carbide for use in the manufacture of acetylene, and for the manufacture of illuminating gas itself—"thus enabling us at one and the same operation to manufacture calcium carbide in the electrical furnace, and to generate a gas suitable for general illuminating purposes." One object of the invention is stated to be to provide a plant in which the heat generated by the electrical furnace or retort to fuse the materials in the manufacture of calcium carbide may be utilized as a means for heating air to be employed in the manufacture of illuminating gas. A further object is to provide an apparatus in which acetylene may be generated, and in which hot air may be carburetted—such operations being performed independently. The apparatus is so constructed and arranged for service that the gasprodu ced by carburetted air may be enriched by combining acetylene gas with it; and subsequently intermingling the combined gases by decomposing them, due to the action of heat in the electrical retort or furnace, "thereby producing a superior quality of illuminating gas." A still further object of the invention is to provide an improved carbide furnace or retort in which the parts are arranged for easy access and manipulation, and in which the passage of air or gas through their heating appliances may be effected continuously, to carry on the manufacture of gas uninterruptedly while the furnace is being charged or the product removed.

Gas-Burners.—Léry, J. B. de, and Armington, W. A., of New York. No. 7574; April 11, 1899.

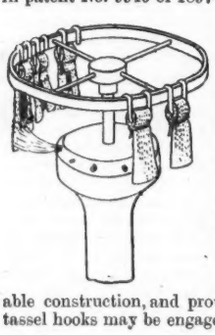
This invention relates especially to gas-burners used in street-lamps with incandescent mantles, where it is important that the lighting and turning out should be effected with the least possible explosion.

To effect this purpose, the invention comprises the following essential elements: 1. A flash-tube, termed a "lighter," extending below the lantern and communicating (as shown) with the gas-way by a channel of small diameter, which admits only a minute stream of gas to the "lighter." This lighter is perforated with a series of small holes, or is slit from end to end; the gas issuing from the holes or slit, so that when the torch is applied to a lower hole outside the lantern a small flame will flash up the tube to a point within the lantern and adjacent to the main burner. 2. A valve or cock body and a plug therein; the body containing only one main gas-way and a small channel leading to the "lighter," and the plug containing transverse ports so arranged with reference to the gas-way and channel of the body that, in one position, all the ports will be shut off, in the next position (corresponding to the beginning of the opening of the cock) the "lighter" will be put in communication with the gas-way, and at the same time a small stream of gas will be allowed to pass through a secondary port to the burner, to be there ignited from the lighter with only a small explosion, and when the cock is turned full open the main port of the plug will alone be in communication with the main gas-way, allowing the full stream of gas to reach the burner, while the channel to the lighter and the secondary port will be closed.



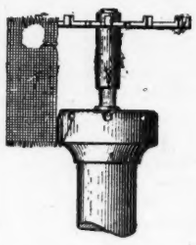
Incandescence Gas-Burners.—Léry, J. B. de, of New York. No. 10,705; May 23, 1899.

This invention has special reference to burners of the type described in patent No. 9940 of 1897—known as "De Léry Tassel Burners." The objects of the present improvements are: To facilitate the operations of renewing the tassels and of adjusting them upon the burners; to prevent the deposition of soot or carbon upon parts of the burners; and, incidentally, "to effect an economy in the quantity of incandescing material, and to ensure a brilliant illumination." As shown, the tassels are hung in a circle, and are respectively supported at the outer ends of the arms of a star-shaped frame; the means for connecting each tassel with the arm being a spool saddled by the incandescing material, and slipped radially over the end of the arm. The later improvements consist in equipping each tassel with a hook of suitable construction, and providing the burner with a ring with which the tassel hooks may be engaged—thus rendering the operation of adjusting any individual tassel a very simple one. The ring is supported from a central hub by small radial arms (three being sufficient); thus leaving a practically unobstructed area inside the ring.



Incandescent Gas Lighting.—Armington, C. F., of Roxbury, Mass., U.S.A. No. 11,653; June 5, 1899.

The construction of this arrangement for incandescent gas lighting will be seen from the sketch—it is not an ordinary shape of "mantle," but a folded strip of some textile fabric chemically treated to give it incandescent properties. The folding of the fabric exposes the "greatest practicable surface completely to the direct action of the flame, yet without interfering with the free passage of the flame into the interior and out through the top." Another important feature consists in so supporting the folded mantle as to minimize the transmission of jarring vibrations through the means of support, yet without obstructing the free passage of the flame through it. This is accomplished by supporting it with a loop of soft incombustible material (such as asbestos) passed directly through the folds near the top. A series of these folded fabrics are to be hung upon the radial arms of the burner shown; "care being taken to hang them with the open sides toward the radial holes through which the gas-flame escapes." That part of the fabrics below the loop will then form two longitudinal compartments open at top and bottom; the inside walls "being completely bathed in the flame passing in at the bottom and open side." A large number of fabrics can be hung about such a burner; and it will be found, says the patentee, that each portion "will become incandescent throughout its whole surface, while the light obtained, owing to the complete incandescence of both the outside and inner walls, much exceeds, both in quantity and quality, that of any incandescent mantle heretofore known."



APPLICATIONS FOR LETTERS PATENT.

15,238.—Young, W., and Fyfe, J., "Retorts for the destructive distillation of shale." July 25.

15,239.—Exley, J. H., "Filtering and purifying hydrocarbon gases." July 25.

15,279.—Pilla-Deflers, L., "Acetylene lamps and generators." July 25.

15,286.—Lederer, L., and Gottlieb, J., "Automatic carburettors." July 25.

15,333.—Huguenin, J., "Portable safety acetylene gas apparatus suitable for table-lamps, and applicable to dwelling-houses, railways, and carriages." July 26.

15,344.—Steward, D. M., "Burners specially adapted for acetylene gas." July 26.

15,388.—Morley, W., and Barker, P. W., "Forming the joints of pipes or mains." July 27.

15,406.—Bartmann, L., "Acelytene-gas generators." July 27.

15,429.—Dart, A. E., and Crombie, H. S., "Pipe-couplings." July 27.

15,431.—Lagoutte, F., "Gas and like motors." July 27.

15,447-8.—Steinicke, G., "Explosion or gas engines." July 27.

15,459.—Mottlau, A., "Portable acetylene generators." July 27.

15,468.—Robinson, G. H., and Best, W. V., "Fastening the lids of retort mouthpieces and other self-sealing lids and doors." July 28.

15,506.—Dolan, E. J., "Packing calcium carbide and generating acetylene gas therefrom." July 28.

15,511.—Laird, W. H., "Manufacturing gas." July 28.

15,521.—Sugg, W. T., "Incandescent gas lighting." July 28.

15,530.—Clamond, C., "Gas-stoves." July 28.

15,540.—Heybrock, F., "Illuminating device or globe for incandescent gas light, acetylene light, and the like." July 28.

15,543.—Diamond, W., "Clarifying spent liquor from sulphate of ammonia plant." July 29.

15,598.—Bamberg, G., "Incandescent gas-burners." July 29.

15,608.—Kilner, B., and Laycock, S., "Feeding fuel to gas-producers and the like." July 31.

15,609.—Dransfield, W. H., "Fixing gas and water pipes to walls." July 31.

15,644.—Küpper, F., "Electrical ignition apparatus." July 31.

15,662.—Radcliffe, F., "Gas-producers." July 31.

15,679.—Waddell, A., "Lifting and carrying apparatus for purifier covers." Aug. 1.

15,695.—Southall, J., "Internal combustion engines." Aug. 1.

15,696.—Pordes, B., "Automatic incandescent gas lighter." Aug. 1.

15,707.—Williams, H. M, "Gas-stoves and ventilators." Aug. 1.

15,746.—Bieler, M., "Measuring liquids." Aug. 1.

15,760.—Zacher, F., "Self-lighting gas-burners." Aug. 1.

15,818.—Boyesen, B. C. T. E., "Elevators." Aug. 2.

15,826.—Riotte, E., "Generating acetylene gas." Aug. 2.

15,900.—Bachmeyer, A., "Bye-pass cock for self-lighting gas-burners." Aug. 3.

15,910.—Ruud, E., "Internal combustion engines." Aug. 3.

15,977.—Higgins, W., and Sandilands, H., "Production of acetylene gas." Aug. 4.

15,978.—Higgins, W., and Sandilands, H., "Gas-engines." Aug. 4.

16,002.—Seagrave, G., "Acetylene gas producing apparatus." Aug. 4.

16,022.—Rowbotham, W. & K. A., "Explosion engines." Aug. 5.

16,033.—Smithson, T. H. J., "Automatic liquid meter." Aug. 5.

16,036.—Johnson, W. B., "Manufacture of gas." A communication from J. A. Faux. Aug. 5.

16,053.—Apt, J., "Illuminating media for use in incandescent gas lighting." Aug. 5.

16,056.—Friedeberger, L., and The Vulkan Gesellschaft für selbstzündende Glühkörper mit beschränkter Haftung, "Igniters for gas." Aug. 5.

16,080.—Boult, A. J., "Carburettors." A communication from L. Longuemare. Aug. 5.

CORRESPONDENCE.

We are not responsible for the opinions expressed by correspondents.]

The Reduction of Sunday Labour in Gas-Works.

SIR,—The inquiry in your issue of the 4th ult. (p. 40) with regard to the reduction of Sunday labour in gas-works does not appear to have been replied to. Having had many years' experience of the "Sunday stoppage" under various conditions, and also of continuous work, will you allow me to say, in reply to your correspondent, that in the works with which I have been connected it has been the general rule to cease work in the retort-houses every Sunday, for 16 hours out of the 24. Of course, there have been occasions when, through stress of weather, &c., cessation has not been possible at all, or only for eight hours.

The stoppage causes the cracks in the retorts to open slightly; but these are easily dealt with in the ordinary way—no special or extra labour being required. I do not find any appreciable falling off in the make of gas, or in the heat of the retorts, where the arrangements for the stoppage are carefully made. The wear and tear of the retorts under this system is somewhat greater than when they are worked continuously; and there is an expenditure in wages, in connection with the stoppage, which is not directly remunerative. These disadvantages, however, are, in my opinion, not to be considered in comparison with the immense benefits, both moral and physical, which accrue to the men from the Sunday rest.

Apart from the Divine command, which I presume is as binding upon corporations and companies as upon individuals, my experience convinces me it is to the interest of all those owning gas-works that Sunday labour of all kinds, and especially in the retort-houses, which is not absolutely necessary, should be dispensed with for either 12 or 16 hours of the day. I feel sure a comparison of the results obtained in gas-works where the Sunday stoppage is the rule, with those from works where there is no cessation, would show greatly in favour of the former.

Crystal Palace Gas-Works,
Lower Sydenham, S.E., Aug. 10, 1899. SYDNEY Y. SHOUBRIDGE.

Enormous Consumption of Water.

SIR,—The statement made at the meeting of the Epsom Urban District Council, reported in the "JOURNAL" for the 1st inst. (p. 328), requires some explanation. It was stated that Tunbridge Wells is satisfied with 21 gallons of water per head per day for all purposes; whereas the Sutton Water Company require 40 gallons. When statements of this description are made at Council meetings, it is generally supposed that some inquiry has been made. If Tunbridge Wells is a fully water-closeted town, with the usual number of baths, a large number of garden hose and sprinklers, the sewers properly flushed, the streets fairly watered, and all sanitary arrangements well regulated, I cannot accept the Sutton Water Company's statement that only 21 gallons per head per day are consumed during these excessively hot months.

In such well-regulated towns as Tunbridge Wells, Torquay, Eastbourne, Richmond, and the suburbs of London, 40 gallons per head per day during the drought must often be exceeded. The Grand Junction Water Company, who usually pump 18 million gallons per day, rose on one occasion to 25 million gallons. When the hot weather commenced, the East London Company pumped in *excess* 5 million gallons daily, and then rose in *one day* to 11 million gallons excess. The same enormous output occurs at every water-works during a drought, when there are a large number of gardens, water-closets, baths, hose, and sprinklers. If the Sutton Water Company have proved that 21 gallons per head per day are sufficient for Tunbridge Wells during the summer, why not adopt the same method of detecting waste, and so reduce the "enormous consumption," and save the fees of a consulting engineer for a population of 10,000 only?

To check the quantity of water pumped at the works is of the first importance; and this should be done by fixing in the supply main a Venturi tube and a recording-gauge, as is now being done in most water-works. Night inspection with the stethoscope will stop all waste; and the supply of water for gardens, hose, and sprinklers should be mostly charged for by meter, as for trade purposes—reserving a minimum rate. This will stop all waste, and prevent the hose being left to run all night; and consequently it will increase the revenue greatly.

Aug. 8, 1899. ENORMOUS WASTE.

A Correction.—In the article on "The Consumption of Water per Head in Different Towns," in the last number of the "JOURNAL," the sentence, near the middle of the last paragraph but one, commencing "The consumption per head per day can only be approximately ascertained by the pumping records," &c., should have read to the effect that these records are of "no assistance in determining the amount of waste or in preventing it."

Gas-Workers' Wages at Bolton.—At a recent meeting of the Gas Committee of the Bolton Corporation, the application of the different grades of workmen at the two gas-works for an increase in wages was again considered. Information having been obtained from other towns as to salaries paid, it was resolved that the maximum rate for gas-fitters should be increased from 8½d. to 9d. per hour, the minimum rate to remain as at present—namely, 8d. to 8½d. per hour.

Alteration of Gas-Rates at Bolton.—The Gas Committee of the Bolton Corporation have resolved that from the termination of the June quarter, the gross price of gas within the borough shall be reduced from 2s. 9d. to 2s. 6d. per 1000 cubic feet, and outside the borough from 3s. 3d. to 3s.; also that the discount to be allowed on all accounts paid within the specified time (21 days from the date of delivery of the invoice) be 3d. instead of 6d. per 1000 cubic feet. This means that the amount of discount lost on non-payment of rates within the specified time will be considerably reduced.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Last Wednesday, the closing day of the session, the following Bills received the Royal Assent: Belfast Corporation Bill, Bootle Corporation Bill, Darwen Corporation Bill, Derwent Valley Water Bill, Fylde Water Board Bill, Gas Orders Confirmation Bill (No. 2), Great Yarmouth Water Bill, Leigh-on-Sea Urban District Council Bill, Wakefield Corporation Bill, Warrington Corporation Bill, Wolverhampton Corporation Bill, Workington Corporation Bill, Yeadon and Guiseley Gas Bill.

HOUSE OF COMMONS.

Monday, Aug. 7.

LOCAL AUTHORITIES AND WATER DIVINERS.

Mr. Pickersgill asked the President of the Local Government Board how many appeals had been made to the Board against disallowances in the accounts of Urban District Councils of moneys paid from the rates for the employment of water diviners; what were the amounts involved, the dates of the disallowances, and the dates on which they were decided; and whether the Board had allowed the appeals in some cases and had held that water diviners could be legally employed at the cost of the rates. If so, whether the Law Officers of the Crown had been consulted. Mr. Chaplin, in reply, said appeals had been made; and the sums disallowed were £13 8s. 7d., £7 13s. 6d., and £3 8s. The disallowances were made in May and August, 1897, and in August, 1898. One of the appeals was at present before the Board; but in the other two cases they had been allowed. The decisions were given in October, 1898, and March, 1899. The Board did not deem it necessary to consult the Law Officers of the Crown on the case. They were advised by their own legal adviser that the reasons assigned by the Auditor for making the disallowance did not, in point of law, support the action he took.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, Aug. 9.

(*Before Mr. Justice* BYRNE.)

In re the De Mare Patent.

Mr. BOUSFIELD, Q.C., moved for leave to disclaim on certain points in the petition for the revocation of this patent presented by the Welsbach Incandescent Gas-Light Company.

Mr. T. TERRELL, Q.C., on behalf of the Company, raised no objection to the disclaimer, if limited to the points named.

His LORDSHIP gave leave accordingly.

Mr. BOUSFIELD then moved again, on behalf of the New Sunlight Incandescent Company, for the committal of Sir Henry Burdett, K.C.B., Chairman of the Welsbach Company, or alternatively for an injunction restraining the Company from continuing to publish the opinion which their Counsel had given to the effect that the De Mare patent was unquestionably invalid.

Mr. TERRELL, Q.C., and Mr. WALTER appeared for the respondents.

On the part of the applicants, an affidavit was filed proving the purchase of newspapers containing the letter of Sir Henry Burdett setting out the opinion of Counsel. In answer thereto, Sir Henry had filed an affidavit stating that the Sunlight Company were the owners of the De Mare patent; that as far back as the month of June, 1898, they had applied to amend the specification of De Mare's patent, which was for a burner; that, notwithstanding their application to amend in June, 1898, they issued a writ against the Welsbach Company in respect of their manufacture and sale of the Kern burner in the month of August, 1898; and that Mr. J. H. Duncan, the Chairman of the new (reconstructed) Sunlight Company and of the old Sunlight Company, had in his address to the shareholders stated that the Kern burner was subject to the De Mare patent. He also stated that the agents of the Sunlight Company had been threatening the customers of the Welsbach Company with proceedings for infringement of the De Mare patent, and had sent out circulars stating that they were about to proceed with all speed with their action against the Welsbach Company for infringing that patent; but, notwithstanding that six weeks had elapsed since the issue of the circular, no step had been taken by the Sunlight Company to proceed with their action. Owing to the persistent statements of the Sunlight Company, the Welsbach Company had obtained the opinion of their Counsel to the effect that the De Mare patent was unquestionably invalid, as it claimed matters which were notoriously old; and it was alleged that the threats and advertisements of the Sunlight Company must be *malâ fide*. In view of the opinion of their Counsel, the Welsbach Company had presented a petition for the revocation of the De Mare patent, and had published the letter complained of, for the protection of their shareholders and customers. An affidavit, in reply, referred to the action in which Mr. Hayes sought to obtain specific performance of a contract he had entered into with the Sunlight Company for the purchase of the De Mare patent, which Mr. Justice Romer held he was entitled to; but the Court of Appeal reversed his decision.

A long argument ensued, in which Mr. BOUSFIELD submitted that the whole course of conduct on the part of the Welsbach Company showed a desire to take an unfair advantage of his clients; that the publication of the letter in question was a contempt of Court within previous decisions; and that it ought to be restrained. He offered to undertake, on the part of the Sunlight Company, that no circulars should be issued of which complaint could be made.

Mr. TERRELL, in reply to his Lordship, said he claimed the right to publish the letter, and submitted that he was entitled to do so under the 32nd section of the Patent Act. He also pointed out that patent actions stood in a different position from any other, inasmuch as they could not be tried by a jury, but only by a Judge of the High Court; and therefore there was no possibility of the course of justice being interfered with by any statements in a newspaper. The application to amend the De Mare patent was tantamount to an admission that it was invalid; and yet, after the application, the Company brought an action for infringement. The decision of the Court of Appeal was given on the 27th of June (*ante*, p. 60); but no steps had been taken to proceed with the amendment of the patent. Their threats, therefore, could not be *bonâ fide;* and his clients were, he submitted, entitled to state that the patent was bad, and that their customers need not be alarmed. Every word in the letter was absolutely true.

After a short reply from Mr. BOUSFIELD,

Justice BYRNE said the motion was to commit the Chairman of the Welsbach Company, or, in the alternative, for an injunction (which was what was really asked for) to restrain the publication of a certain letter. Having read the letter, his Lordship went on to say that prior to its publication the new Sunlight Company had sent out to customers of the Welsbach Company and others a circular in which they stated the effect of the decision of the Court of Appeal, and said: "This leaves us free to stop the sale of the Kern burners, as we intend to do by the most prompt measures possible." Now, what was the real position? Twelve months ago an application was made to amend the De Mare patent. It was not proceeded with; and it was said that the application was tied up for a considerable period owing to other litigation between the parties. But now this litigation was at an end, and it was not intended to proceed with the application to amend. He had that day given leave for an application to be allowed to disclaim on the 24th of July a petition for the revocation of the De Mare patent which was presented by the Welsbach Company. It was quite clear the Court had jurisdiction to prevent the publication of statements calculated to prejudge the case, to interfere with or deter witnesses, or to impede the course of justice. It was said that section 32 of the Patent Act had made a great difference. It enacted that where any person claiming to be the owner of a patent threatened any other persons with legal proceedings or liability, any person aggrieved might bring an action against him, obtain an injunction against the continuance of such threats, and recover damages in certain events, and so on. But it was provided "that this section shall not apply if the person making such threats, with due diligence, commences and prosecutes an action for infringement of his patent." If and so far as the threats might, but for the section, have been held, by reason of there being threats, to fall within the rule of the Court with reference to commenting on pending proceedings, this might have made a change; but it was not necessary to go very closely into the question whether it had or not. He was clear that the section was not intended, beyond that, to justify any public discussion of the merits of pending litigation. In the present case, the letter contained something more than a mere threat to deter people from taking proceedings, but it did not go far beyond it; and, having regard to the method adopted by the Sunlight Company in publishing the letter to which he had referred, he did not think he should be justified in granting an injunction to restrain the publication of this letter. That must not, however, be taken as an intimation that if the Sunlight Company discontinued publishing what they had done, and offered an undertaking not to continue such things, he should necessarily hold a continuance of such letters justifiable. The circumstances would then be different. What he felt was that, under existing circumstances, having regard to what had been done by the Sunlight Company, he should not be justified in granting the injunction. The motion must therefore be refused, with costs.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Saturday, Aug. 12.

(*Before Mr. Justice* BUCKNILL.)

Crays Gas Company v. Bromley Gas Consumers' Company—The Boundary Question.

The arguments in this case were concluded on the 3rd inst. (see *ante*, p. 374), when judgment was reserved.

His LORDSHIP, in giving his decision to-day, said the question of first importance in the case was whether the defendant Company had the right to lay mains and pipes for the supply of gas to the Workhouse in the parish of Farnborough, and the supply of gas in the parish of Orpington and certain portions of Chislehurst. The plaintiffs denied such right, and set up a binding contract to this effect between themselves and the defendants in the year 1865, while the defendants, on the other hand, denied the existence of any such contract, either at all or at any time, or in such a form as to make it binding upon them; in other words, that it was not in writing and under seal. If the contract was in writing, it had been lost; and the question had to be decided on the evidence of the witnesses, together with documentary evidence and such admitted facts as threw light on the case. He would first call attention to the facts which were not in dispute. In the year 1854, the Bromley Gas Consumers' Company was formed, and it was afterwards registered under the title of the Bromley Gas Consumers' Company. In 1865 they were lighting with gas the greater portion of Bromley, and some part of Chislehurst and Beckenham. In that year they applied to Parliament to be re-incorporated, and asked for power to supply gas to Chislehurst, Orpington, and Farnborough, among other places. In 1863 the Crays Gaslight and Coke Company was formed to light with gas the parish of St. Mary Cray, St. Paul's Cray, and other places; and they also applied to Parliament in 1865 for power to supply gas in the parishes of Chislehurst, Orpington, and Farnborough. Thus both Companies were asking for parliamentary powers to supply these three parishes, together with other places, which were not common to both. It was said that in the same year three other Gas Companies had Bills before Parliament—viz., the Crystal Palace District Gas Company, the Eltham Gas Company, and the Kent Gas Consumers' Company. It appeared from the minutes of the plaintiff and defendant Companies that in 1864, when they determined to apply for parliamentary powers, the Kent Company intended to include in their proposed Bill part of the Bromley and part of the Crays district; and the Crays Company determined to petition against the Kent Company on this ground. But as the promoters of the Kent Bill agreed to omit any part of the Crays district, this opposition fell through. The same result happened as between the Kent and Bromley Companies. He only mentioned this as showing that the plaintiff and defendant Companies were then acting against the common intruder, and were on friendly terms with each other. If an agreement were not come to by which, before they went to Parliament, their respective districts were defined, they would probably find themselves in contest when they came before the Committee; and that they did have some discussion on the subject was an admitted fact, because in the minute-book of the Bromley Company, under date of Nov. 16, 1864, there was a minute to the effect that their Chairman, Mr. Robinson Latter, had seen Mr. May, the then Secretary of the Crays Company, and had ascertained from him the willingness of his Company to enter into a deed of arrangement defining the boundary of the Company's district with that of the Bromley Company. There was no similar entry in the Crays minute-book. The question was how far these negotiations were carried, and if they ever were concluded by a binding agreement between the two Companies. On Dec. 5, 1864, a letter from Mr. May on behalf of the Crays Company to Mr. Latter on behalf of the Bromley Company showed that the matter was still open: "I should like to see you about settling the districts of each Company." On the 18th of January there was this letter: "The Crays Company could not allow you to take all the district proposed in your Bill without some agreement is previously come to." On April 5, 1865, Mr. May wrote: "The Directors have appointed two of their number to meet on the spot to settle the district. Will you please appoint a time and place, and let me know?" This letter was referred to by the defendants in their letter to the plaintiffs, about which a good deal had been said, of Nov. 27, 1890. On April 6, 1885, Mr. Latter wrote to Mr. May that the district to be agreed upon could be better delineated by a map than by a meeting on the ground; and on the 19th of April, Mr. May wrote that he and the Sub-Committee would call on Mr. Latter to discuss the question of the district. There the correspondence in 1865 ended. In that year, Mr. May and Mr. Latter were authorized to meet to make a binding agreement as to the district of each Company. Mr. May in his evidence stated that there was a meeting between himself and Mr. Latter in April, 1865, to settle the question of district and boundaries; that being the time when, if no agreement had been come to, each Company could, and probably would, have opposed the other in Parliament. Mr. May said that two of the Directors of the Crays Company went with him to see Mr. Latter, and at that interview an agreement was arrived at, and a plan or map was marked; and it was agreed that neither Company should oppose the other in Parliament. He declared that an agreement was then and there drawn up and signed in the presence of Mr. Stanger and Mr. Francis. Until last year that agreement was loyally kept by both Companies. Mr. May stated that they understood that, if they did not agree, the question of boundary would be settled by Parliament; and, no doubt, after considerable discussion, they did settle the agreement, and marked on the plan the three points at which the Bromley Company were to stop. The 48th section of the Bromley Company's Act contained words to the effect that the Company might from time to time agree, in writing, with any Company having power to supply gas within the limits of the Act, to define the boundary beyond which the parties to the agreement should not supply gas without the consent in writing of the other. On behalf of the plaintiffs, it was suggested that this clause had special reference to this agreement; but, on the other hand, it was said by one of the defendants' witnesses that it did not, but only referred to the Crystal Palace District Gas Company. Whether or not there was such an agreement, it had been proved that after July 5, 1865, the plaintiffs proceeded to lay down their mains in Orpington, and had alone supplied gas there since. In 1884 the plaintiffs considered the question of laying their mains in Farnborough; but, before this, in 1881, correspondence had been carried on between the two Companies which might be shortly described thus: There were two places in the plaintiffs' district near the agreed boundary, and the defendants had been approached by third parties to supply them with gas; and to enable them to do this they applied to the plaintiffs for permission. This incident gave rise to a discussion as to boundary arrangements between them, as appeared by a letter written by Mr. Osborn, the defendants' former Secretary, on Dec. 9, 1881: "Will you send me a copy of the boundary arrangement between us, as I do not seem to have it?" In reply, Mr. May promised to look for it; but he afterwards said he could not find it, and suggested that Mr. Salter had a copy. Apparently it could not be found. At all events, it was worthy of remark that Mr. Latter did not appear at that time to have denied its existence. He (his Lordship) could only read the correspondence as proving that, at some time earlier, there had been a boundary agreement. In 1884 a question arose about the plaintiffs supplying gas to Farnborough; and they decided to carry their mains from Orpington Station to the village and other places. It was then mutually agreed that it was within their district. In 1884 and 1886 the plaintiffs spent £2000 in extending their mains to Loch's Bottom and Fox's brewery, without objection from the defendants. The defendants contended, first, that the proposed arrangement, whenever made, came to nothing; secondly, that whatever arrangement was made was in 1884, and not in 1865; thirdly, that whatever agreement was come to referred to Chislehurst only; fourthly, that Mr. May's evidence was inconsistent with an affidavit made by him at an earlier period of the litigation, and if the watershed dividing the Ravensbourne Valley from Crays was the boundary, the Union was in the defendants' district. Mr. Wilde, a Director of the defendant Company, in his evidence, said there never was a written agreement between the two Companies; but his recollection did not appear to be very good. After referring to the evidence of the other witnesses for the defendants, and to the correspondence, his Lordship said he came to the conclusion that the letters tended to show that Mr. May's recollection of what took place was to be relied upon. There was no law in the case; the simple question was, whether there was in 1865 a signed agreement in writing made between Mr. May and Mr. Latter. All the probabilities of the case were in favour of the story told by Mr. May. In 1865 the two Companies were on friendly terms, and were anxious to avoid opposition to each other in Committee; and they took the very wise course of preventing this by

entering into a properly signed agreement, so as to obviate future disputes. It was to be regretted that this litigation had been carried on to the end, seeing that the Companies had been neighbours for so many years. He thought the plaintiffs were right in their contention; and therefore judgment would be entered in their favour, with costs.

The Lanchester Gas-Engine Patent.

In the Court of Appeal last Thursday, Lord Justice Romer read the udgment of the Court in an appeal from a decision of Mr. Justice Kekewich in an action brought by the British Motor Syndicate, Limited, and the Great Horseless Carriage Company, Limited, against Messrs. J. E. H. Andrew and Co., Limited. The plaintiffs, as the registered proprietors of patent No. 5479 of 1890, granted to Frederick William Lanchester for "improvements in gas motor engines," brought the action to restrain the defendants from infringing the patent. Mr. Justice Kekewich held that there had been no infringement; and he dismissed the action, with costs. (See "JOURNAL" for Jan. 31 last, p. 248.) The decision was based on the ground that the patentee had, by his specification, claimed only his main method of carrying out his invention, and not two subsidiary methods. The defendants had raised the other objections usual in patent cases, such as disconformity, anticipation, and want of new subject-matter. The plaintiffs appealed. Mr. Moulton, Q.C., Mr. T. Terrell, Q.C., and Mr. A. J. Walter appeared for them; Mr. C. A. Cripps, Q.C., and Mr. J. C. Graham represented the defendants. The arguments in the appeal were heard last month; their Lordships reserving judgment. Justice Romer said the plaintiffs' patent related to the starting of gas motor engines; and the patentee had shown one main and two subsidiary methods of doing this. The former was referred to in both the provisional and the final specifications. In the latter, he gave two variations of his main method, which variations the Court had called "subsidiary methods." His Lordship discussed the nature of these; and he then proceeded to consider the points taken by the defendants. With regard to the point on which they succeeded in the Court below, his Lordship said they thought it was too narrow a construction to be placed on the specification. In the body of it, the patentee clearly referred to the subsidiary methods, and intended them to come within the scope of his invention. His Lordship added that the wording of the first claim covered the subsidiary methods. This objection, therefore, failed, as did also the contention founded upon it, that there had been no infringement by the defendants because in their machine the flame did strike-back in the precise way covered by the patentee's main method. His Lordship discussed the other objections taken by the defendants, all of which he overruled. The Court came to the conclusion that the plaintiffs were entitled to succeed. There must, therefore, be an injunction restraining the defendants from further infringing the plaintiffs' patent, and an inquiry as to damages. The plaintiffs would get their costs there and in the Court below in the usual way, including the costs of the particulars of breaches.

A Gas Manager Charged with Embezzlement.

At the East Dereham Petty Sessions last Friday, Arthur Drage, late Manager of the East Dereham Gas-Works, was charged with embezzling the moneys of his employers, the Urban District Council. Mr. B. H. Vores (Clerk to the Council) prosecuted, and Mr. E. E. Wild represented the accused. Mr. Wild applied for an adjournment of the case; and Mr. Vores offered no objection. After some discussion, the Magistrates decided to adjourn the hearing until the 25th inst.; and the defendant was allowed his freedom, on an extended bail.

The Dangers of Electric Light Conduits.—About four o'clock last Tuesday afternoon, pedestrians in King Street, Manchester, were alarmed by the sound of an explosion and the sudden uplifting of some of the flag-stones on the footway. Several Corporation workmen who were engaged on the opposite side of the street hastened to the spot, and it was found that there had been a disturbance of the footway in the immediate vicinity of the electric light conduit. No definite explanation could be given as to the cause of the occurrence; but it is believed that a quantity of gas had collected at this point, and been ignited by an electric spark or a fusion of the wires. This theory is supported by the statement of a police officer that a flame followed the explosion, and that a smell of gas was distinctly perceptible. The mischief was immediately repaired.

The Price of Gas at Bury St. Edmunds.—At the last meeting of the Bury St. Edmunds Town Council, the subject of the price of the gas supplied to the public lamps was under consideration. The Council have been asked to pay 2s. 6d. instead of 2s. 3d. per 1000 cubic feet for gas supplied to the street-lamps; there being an arrangement that the borough was only to be charged cost price, in consideration of the Gas Company having received a loan of £2500 from the late Paving Commissioners. The Borough Treasurer (Mr. J. H. Wakefield) reported that he had not come to any arrangement with the Company as to the cost price. Alderman Lake spoke in favour of an explicit account being given to the Council, who he thought were entitled to such a statement. The difference between 2s. 3d. and 2s. 6d. per 1000 cubic feet of gas was a rise of 11 per cent. This was a large increase in the cost of production. The Company sought to account for it by saying that the price of coal had gone up; it being urged that it was only fair that the town should pay more for public lighting now, having agreed to pay 2s. 4½d. in 1891. So far as he had been able to ascertain, there had not been an increase of 11 per cent. in the price of coal since 1891; but even supposing there had, wages and everything else would have had to go up to a corresponding extent to justify such an increase being charged to the Council. There was no suggestion that this was the case. So far as the price charged last year was concerned—2s. 3d. per 1000 cubic feet—he thought it looked like a fair one, having regard to additional expenditure; but at this rate it seemed as though they had been paying too much in previous years. After some further discussion, it was understood that a deputation would probably meet the Directors of the Company to discuss the matter.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Company was held last Wednesday, at the City Terminus Hotel, Cannon Street, E.C.—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) having read the notice convening the meeting, and the minutes of the last meeting, the seal of the Company was affixed to the register of proprietors, and the report and accounts (*ante*, pp. 316, 317) were presented.

The CHAIRMAN, in moving—"That the report and accounts now presented be received and adopted, and the report entered on the minutes," said the report opened with the following statement: "The event of the year, in regard to the supply of gas to the Metropolis, has been the appointment by the House of Commons of a Select Committee to inquire into the powers of charge conferred by Parliament on the Metropolitan Gas Companies, and to report as to the method in which those powers have been exercised, having regard to the differences of price charged by the various Companies." This was the most important matter to be brought before the meeting; but before proceeding to deal with the special recommendations of the Committee, there were two or three points in relation to the accounts which he would bring to their notice. One of the most important of these was the question of the reduction in the price of gas. In June, 1898, they had a surplus, after payment of dividend, of something over £17,000. Part of this amount—viz., £4666—was carried to the reserve fund (that part which was divisible but not divided); and the balance was carried forward. In December, 1898, they also had a surplus of about £17,700, £4666 of which was carried to the reserve, and £13,000 added to the amount of the undivided balance, bringing this sum up to £27,000. On the strength of this surplus, in December last the Directors announced a reduction in the price of gas of 1d. per 1000 cubic feet to the ordinary consumers, and 2d. per 1000 cubic feet to consumers by slot meters. This 2d. per 1000 feet to the slot-meter customers was given because 1d. was due to them; they not having had 1d. when the previous concession to the ordinary consumers was made. The effect of this reduction was to lower the receipts for the half year now under review by something over £23,000. The effect of this reduction, however, had been shown in the working of the past half year, for they had again a surplus. He thought that lowering the price had stimulated consumption, and had helped the Directors to appear before the proprietors on this occasion with a surplus of close upon £16,000. The Directors, encouraged by the result of the reduction at Christmas, had announced a further reduction of 1d. per 1000 cubic feet. This would take £20,000 off in the current half year; and they had good hopes that, with the increase of business which was going on at a very fair rate at the present moment, even during the hot weather, and which they had reason to anticipate throughout the year, and the good price realized for residuals, notwithstanding the increase in the cost of coal, they would be able to come before the proprietors next time with a sheet on which expenditure was balanced by receipts. However, he was not going to prophesy; but he thought they might expect this, at any rate. The reason he mentioned this was to defend the reduction in price. A good deal of objection was sometimes made, and only last week there was raked up some report of the South Metropolitan Company in 1865, when a shareholder got up and objected to the reduction that had then been made. Well, these constant reductions had this effect—they tended to consolidate the business, and to make the holding of investors more stable and secure, as was evidenced by the position which the Company occupied at the present moment. If they had charged a high price for gas, he had not the slightest doubt that their prosperity would not have been what it was. They would not have stood so well with the consumers; they would have had to meet a much more severe competition; and their property would not have occupied the high position it now held in the market. Therefore he thought that the policy which had been so successful for the last thirty or forty years was the best policy to pursue for the investor. He was not speaking of the mere speculator. For the speculator who bought one day in the hope of a rise on which to sell the next, he cared nothing. Such shareholders were not desirable. For the genuine investors, they wished to make the property as secure as possible. Another point in the accounts to which he might draw attention was the continued fall in carbonizing wages. These were about 2s. 7d. a ton before the strike; then they went up to 3s. 7d., or more; and they had since been gradually coming down. Whereas last June they were 2s. 2d. per ton, they were now down to 2s. 1½d. An increase of wages, equivalent to 2d. a ton, had been given since last June; and had this increase not been granted, the reduction on the year would have amounted to nearly 3d. per ton of coal. This was produced by continued expansion in the use of machinery, and the good work of the men. In regard to the retort-house (and he said this for the Engineers and the workpeople), there was still room for improvement. The make of gas in the last half year was not quite so good as it had been; but there was no necessity to draw attention to it, as it had been already noticed by the staff, and he had no doubt it would be improved. He would now pass on to the report of the Select Committee. It was a very serious matter indeed, as affecting Gas Companies. In 1875, the sliding-scale was first adopted by a Metropolitan Company—the Commercial—with an initial price of 3s. 9d. per 1000 cubic feet. From 1875 until the present year, the initial price under the sliding-scale had been inviolate. He would explain that. The idea of the sliding-scale was this: Under the old system on which the Companies worked—a system that was very suitable for circumstances of competition, but not for a monopoly—when the supply of gas became a monopoly, it tended in this direction—it gave the shareholders absolute security for their dividend, but it also tended to make them disregard the interest of the consumers. The consumers were not, as a rule, thought of under the old system, as it was felt they ought to be. The sliding-scale was introduced in order to identify the interests of shareholders and consumers—to make it to the interest of the shareholders to serve the consumers well. To do this, an initial price was fixed, and the Companies were to be allowed to increase their

dividends ½ per cent. for every 1d. they reduced the price of gas below the initial figure. On the other hand, they suffered a reduction of ½ per cent. for every 1d. the price was raised above the initial. A large amount of capital had been raised under this system in conjunction with the auction clauses. They had gone to the public and said: "Parliament has authorized us to pay such and such a dividend, if we charge such and such a price for gas. If the price goes down, your dividend is to increase; if it goes up, your dividend is to be reduced." On the faith of Parliament in this connection, the public had subscribed their money. No one had contended more strenuously than he had for the inviolability of the initial price. A reduction of the initial price meant a reduction of dividend. If, with an initial price of 3s. 6d. per 1000 cubic feet, they were selling gas at 2s. 6d., they paid 13 per cent. If the initial price was reduced to 3s., they would only be entitled to pay 11½ per cent. A reduction in the initial price was equivalent to a reduction of dividend—in fact, the initial price was the regulator of the dividend; and Parliament up to the present session had taken this view. But in a case (and one always feared this might happen) where a small Company went to Parliament with a high initial price, which came before a Committee of the House of Lords, of which one of the ablest members of the House was Chairman—Lord Camperdown—he said, in effect: "This Company have too high an initial price; they have not paid their dividend up to the hilt; we are giving them considerable advantages; we are allowing them to convert their stock"—although he (Mr. Livesey) thought that Lord Camperdown had over-rated this advantage—"which is an advantage to the shareholders; and we are allowing them to largely increase their capital, which will also inure to the advantage of the ordinary stock. Under these circumstances, we feel it fair that we should reduce the initial price." The Company contended against that, as he had stated elsewhere; and one of the ablest men in connection with gas industry (Mr. H. E. Jones, the Engineer of the Commercial Gas Company) argued the matter with Lord Campertown. The Committee, however, reduced the initial price 6d. That was the first inroad on the principle. There was a precedent; and he was very much afraid that, when a Committee of the House of Lords presided over by so able a man as Lord Camperdown had set a precedent of this kind, in future when Gas Companies went to Parliament under the sliding-scale Parliament would say: "We must consider your case on its merits; and if you have not fulfilled your duty, we shall not hesitate to follow the example set us in the session of 1899." Following this came the report of the Select Committee; and as this report was an important one, he might be permitted to read one or two extracts. A copy of the Committee's report had been sent to every shareholder, as the Directors thought in an important matter of this kind the shareholders should have all the information that could possibly be given to them. The property belonged to the shareholders, and not to the Directors; and every information which could be given without detriment to the Company's interest, ought to be given. The Committee said: "As indicated in a former paragraph, your Committee have come to the conclusion that the arrangements known as the sliding-scale, as applied to dividend and price, in conjunction with auction sales of stock, have had a beneficial effect upon your gas undertakings"—this was important—"especially as far as the consumer is concerned." There was an emphatic approval of the principle; "and they have received no evidence to induce them to propose any alteration in the system." They then continued:—

But evidence has been tendered which leads them to think that now the standard price is fixed too high, and as a consequence dividends may be paid far above the standard dividend without the full effect of the intention of the framers of this system with regard to the exercise of "due care and economy" being brought into play. Your Committee therefore have come to the conclusion that the time has come when a reduction in the standard price might fairly be recommended, on the grounds that the cost of the production of gas is now much less than it was when the present standards were fixed, and also because capital can now be obtained at a much less rate of interest than formerly. The Committee believe that a small reduction of the standard price, coupled with a secondary sliding-scale for increasing or decreasing dividends, would act beneficially towards securing "due care and economy" in management; and that a system can be so devised that, while it would stimulate those Companies which had not succeeded in bringing their prices to a low level to greater endeavours to that end, it would not interfere with those Companies which had already attained low prices.

Then they said: "It appears, however, to the Committee that this new scale should only be put into operation when any of the Metropolitan Companies apply to Parliament for power to raise further capital." There was some little difficulty in understanding whether this applied retrospectively to the old capital, or whether it only applied to capital that might be raised in future. He was afraid that it applied retrospectively; but it seemed the ground on which they argued this was to be found a little way back, where they spoke of the intention of Parliament: "The intention of the sliding-scale was to give to the consumers a special interest in economical administration, while the control was left exclusively in the hands of the Company. Hence there was an implied obligation on the part of the Company that their affairs should be administered (to quote the language of Mr. Cardwell's Committee) 'with due care and management.'" There they touched upon what they said was the intention of Parliament in granting the sliding-scale. It was perfectly clear that Parliament, in granting the sliding-scale, did not do it for the purpose of increasing the shareholders' dividend. There was not the least doubt they adopted it because they considered it would tend to the advantage of the consumers. If, therefore, in any case the sliding-scale had not tended to the advantage of the consumers as it might have done—if the intention of Parliament had not been complied with, if the implied obligation had not been fulfilled—the Committee said it was competent to revise it; and they made this recommendation—

That whenever any of the Metropolitan Gas Companies again come to Parliament for an extension or alteration of their capital powers, a revision of the sliding-scale should take place, and that the standard price should be reduced to 3s. 3d. to carry the standard dividend of 10 per cent., and that the existing scale of increase and decrease of dividend of ½ per cent. for every 1d. of decrease or increase of price below or above 3s. 3d. be maintained, and that a secondary or additional scale be imposed which should permit of an increase or decrease of dividend over and above that regulated by the present scale, of ½ per cent. for every complete 3d. of decrease or increase below or above the standard price of 3s. 3d.

He was afraid that, whenever any Gas Company went to Parliament, Parliament would say: "We shall stand by the recommendation of our Committee." In the case of this Company, they could urge that they had fulfilled the obligation both in the letter and in the spirit. Parliament would say to them: "Granted; and so far as your Company is concerned, you will not be hurt at all." Taking the price of their gas at 2s. 3d.—and they were pretty safe not to go above this for some time—they would be entitled under the new scale to pay ½ per cent. more dividend than under the old scale. So that the lowering of the initial figure from 3s. 6d. to 3s. 3d. would not affect them at the present price of gas. In fact, it would increase their dividend-paying power. If they went lower, and came down to 2s., they would be entitled under the new scale to pay ½ per cent. more than under the old scale. If they went up to 2s. 6d., they would pay ½ per cent. less than under the old scale; if they went to 2s. 9d., they would pay ½ per cent. less; and if they went to 3s., they would pay ¾ per cent. less. Whether or not it would be wise on their part to say: "We accept the new scale," depended upon the question whether Parliament would in future follow the precedent set by the House of Lords, and interfere with their initial price. If Parliament was going to follow this precedent, he was not at all clear whether it would not be wise to go to Parliament next session and say: "We will accept the recommendation of this Committee," and secure it at once. He did not give this as an opinion; he merely said that it might be the proper course to take. But it placed the Directors in a very difficult position indeed. They had pledged themselves, on the issue of stock to the consumers, on the faith of Parliament, that the dividend would be at such a rate. If the initial price was to be reduced or altered, the dividend might be varied. So long as they kept the price of gas down, and if the new scale were adopted, instead of the dividend being diminished it would be rather increased; but if the initial price was to be interfered with for one excuse, it would be interfered with for another, and Parliament would from time to time set varying precedents. Counsel would be put up to argue indiscriminately against Companies—against those who had served the consumers well, and those who had served them badly; and even the Companies who had served the consumers well must not expect the slightest mercy from Counsel, as they were engaged to argue in a certain direction, and they had no consideration whatever. In fact, he often thought that Counsel were very unscrupulous in the way they argued cases. He would only say, in conclusion, that this matter would cause the Directors a good deal of anxious consideration to know what was best to be done. As far as he was concerned, he could accept the new sliding-scale without detriment to their interests. He did not think there was any probability of having to raise their price high enough to cause any diminution of dividend. Whether waiting four or five years, and then going to Parliament, would be wise, he was not at all prepared to say; for Parliament might have made great alterations before then in the case of other Companies, and the Committee's recommendations would be passed over—perhaps improved upon, perhaps the reverse—and they would not know where they were. The next point was a matter which he could deal with in a more definite manner—

That the area south of the River Thames at present part of the district of the Gaslight and Coke Company, acquired by them from the absorption of the London Gas Company in 1883, should be transferred from the Gaslight and Coke Company to the South Metropolitan Gas Company; a fair and reasonable price being paid by the latter to the former Company for their property in the southern area.

It was argued before the Committee that it was a disadvantage to the Gaslight and Coke Company to have to supply a portion of the district on the south side of the Thames, at the price charged by the South Metropolitan; and it was admitted that the supply was given at a considerable loss. The Committee, therefore, said the best plan for all parties would be to transfer the southern district to the South Metropolitan Company. Colonel Makins said, at the meeting of the Gaslight and Coke Company, that they would be quite willing to do so, and he (Mr. Livesey) could only say, on behalf of the Directors of the South Metropolitan Company, that they would also be willing to enter into negotiations for the purpose. It was more a sentimental matter than anything else. He could not see—nor could the Directors—that there would be any great advantage to them in taking over the district. They would be quite prepared to take it over on fair terms; but it must be on such terms as would protect the interest of the South Metropolitan Company, and he might say definitely, on the part of the Directors, that they did not consider the advantage of taking over the district of sufficient importance to warrant them in going to arbitration about it. If the two Companies could agree as to the price, well and good; but they were perfectly unanimous on the point that they would not risk arbitration on the subject at all. They were quite able to form an opinion as to what it was worth; and they would not give any arbitrator a chance of interfering between them. Then the Committee recommended that Gas Companies should go to Parliament every five years. This was not very pleasant; and he thought Parliament would not like it. There was a constant outcry that Parliament was overburdened with this sort of work; but if Gas Companies were to go to Parliament every five years, it would mean that they would have three times as many Gas Bills every year as they now had. They would hardly find enough members to form the Committees if this course were generally adopted. He did not know that there was much more to be said; but he might refer again to the accounts, in reference to one item which was now becoming a very important figure. In the revenue account the profit-sharing for twelve months stood at £21,027 18s. 2d. £9000 was charged on account of the December half; but still £21,000 odd was the amount paid for profit-sharing in the year. Unless they got value for the money, the profit-sharing system was not justifiable. The Governor of the Gaslight and Coke Company was asked by the Committee whether they had adopted any thing of the same sort, and he replied "No; they considered profit-sharing a philanthropic fad." If it was a philanthropic fad, it could not last. Unless it tended to benefit the Company, no Board of Directors would be justified in continuing a system which entailed an expenditure of £21,000 a year, both in the interest of shareholders and consumers. He would read a few lines of a statement which was given to the profit-sharers at the last distribution. The question was asked—

Does it pay? Where does the bonus come from? The answer is it must

come from savings effected by the employees themselves. In all fairness and honesty, therefore, the profit-sharing bonus must, if it is to last, be produced or earned by internal savings, the result of intelligent and good work done by the Company's officers and workmen. I believe it has been earned in this way, but by no means equally by all the Company's servants. There are many good, honest, intelligent, and industrious workers; and there are some—I do not venture to guess how many—who take little or no interest in the Company, and who do not earn their share of the bonus. The bonus these careless and indifferent workers receive is therefore earned for them by the good workers, which is certainly not fair.

Now what they intended to do was this. The system had been going on for ten years. They had shown much patience; and had done all they could—not only himself, but the officers of the Company, and particularly he might mention the Accountant (Mr. Sims), the Hon. Secretary of the Profit-Sharing Committee, who had given his heart to the work. They had all done their best to make it a success; and the result had passed their expectations. The bonus was worth having; and those men who did not show an interest in their work, and a desire to promote the welfare of the Company, would not be allowed to participate in future. In the past they had in some cases struck out certain men, and told them that until they improved, they would not be allowed to participate; and this rule would now be more strictly carried out. They wished to make the thing a success; and the only way it could be made a perfect success, was by getting everyone to take an interest in his work and in the Company. There was one other thing he might mention—namely, that they had recently adopted a scheme for the purpose of improving the public lighting. The great difficulty of effecting an improvement in public lighting had been the initial cost of making the change. They had 21,000 of the old-fashioned lamp-posts and lanterns in their district, which had been paid for by the parishes; and to make a change would involve a heavy cost. Therefore the Company had stated that, by the adoption of the incandescent system of gas lighting, the consumption of gas could be reduced, and that there would be a material saving in the cost of gas supplied to the public lamps, and, of course, a reduction in the annual charge per lamp. The Company offered to undertake the first cost of making the change of placing improved lanterns in the main streets and putting in new burners everywhere, carrying the cost to a suspense account—the parish paying the same rate as before. In four or five years the amount would be wiped off without any perceptible charge upon the parish, as the cost would be gradually covered by the saving effected by the reduced consumption. By this means they hoped to consolidate their position; and it was highly important that they should do this, and everything else, to maintain the position they occupied, because they were met by very serious competitors. They were not the sole suppliers of light. There were several sources of illumination, all in active and strong competition with them. By endeavouring to improve the light, by giving facilities to the parishes to improve the lighting of the streets, and by cheapening the cost of gas, they would be able to hold their own in the struggle in which they were engaged; and he hoped that in years to come the Company would maintain their position of prosperity, and that they would have as happy meetings in the future when he had passed away as they had had in the past. He had much pleasure in moving the adoption of the report.

Captain T. B. Heathorn, R.A., seconded the motion.

Mr. Hounsom, after referring in feeling terms to the great loss which the Company had sustained by the death of Mr. Frank Livesey, said the Company at the present time, owing to the action of Parliament, stood in a better position than they had ever occupied. He thought he was correct in saying that, owing to the strong lead given by the Board, they stood in a position towards consumers and shareholders that no other Company occupied. He had been a constant attendant at the meetings in Horseferry Road, and heard the views put forward by Mr. Livesey; and those views had been justified to a very large extent by the report of the Select Committee.

The resolution was then put, and carried unanimously.

The Deputy-Chairman (Mr. Robert Morton) moved that a dividend at the rate of 5½ per cent. be declared.

Mr. J. A. Butcher said it was his proud privilege to be allowed to second the motion for the payment of the dividend for the half year. Whatever might be thought of the dividend, to his mind it was a very handsome one; and he hoped the shareholders were satisfied with it. They lived in very stirring times as regards gas matters. In fact, it might be said that gas was in the air; and if they were not very quiet and particular, they might have an unpleasant explosion What with Parliamentary Committees, agitation by consumers, and other matters, all bearing upon a point where ignition took place, as the Chairman had just remarked, they hardly knew where they were. He hoped that by this time next year they would be in as good a position as they were in now. It had been said that they were not dividend-hunters; and he hoped they were not. The consumers, shareholders, and employees were all in one boat—they were all striving for the success and prosperity of the Company; and if they were sincere in their wish, they would succeed, notwithstanding adverse circumstances. They all had implicit confidence in their worthy Chairman; and while that gentleman held the helm, whatever else might go wrong, their Company would not. As a Workman Director, he was very pleased at the opportunity of addressing the meeting. He trusted that the confidence of the shareholders in electing them on the Board would not be misplaced; and he could assure them that they would do their best to grasp the difficulties of gas manufacture. He was confident that the workmen would endeavour, by every means in their power, to make the Company a success. Of course, there were laggards; but when they were discovered, they were got rid of. It would be impossible, unless the workers were industrious, for a dividend of 5½ per cent. to be paid.

The Chairman said they were entitled to a dividend of £5 12s. per cent., owing to the reduction of 1d. which took place in December last; but instead of dividing more than £5 6s. 8d., the Directors had followed the policy which had been approved by the shareholders in the past, of adding to the reserve fund, which was reduced from £250,000 to £37,000 in consequence of the strike and the heavy cost of coal. This half year £7466 had been added to the fund; but the reduction of another 1d. now entitled them to a dividend of £5 14s. It would become a question next half year whether they ought not to increase the dividend; and if they saw a reasonable probability of maintaining the price at 2s. 1d., then he thought it would not be very long before they would pay 5¾ per cent. But the Directors would not recommend a dividend of 5½ per cent. unless there was a reasonable probability of being able to maintain the price at 2s. 1d., because they considered that a uniform dividend, without fluctuation, was much better than a fluctuating and uncertain one.

The resolution was then put, and carried unanimously.

The Chairman said he had now an important motion—namely, that the salary of the Secretary be increased £300 per annum from the 1st of January last. He had great pleasure in moving this. The Directors had power to deal with the salary of the other officers; but they had no power to deal with the salary of the Secretary. It was nine years since Mr. Bush had had a rise of salary, though his work had considerably increased, and he had also assumed additional duties since the death of Mr. Frank Livesey. Under these circumstances, the Directors unanimously adopted the recommendation that the shareholders should be asked to sanction an increase of £300. He would not mention the amount of the salary; but he could assure them that it was not an exorbitant one, even with the advance, when compared with those of other Companies. He should be much obliged if the shareholders would accept this statement; and when the motion was seconded, unanimously adopt it.

Mr. E. H. Cardwell had much pleasure in seconding the motion. He was sure they all thanked Mr. Bush very much for his zeal and excellent work. Mr. Bush was not only an excellent Secretary, but an excellent friend.

Mr. Jenkins had much pleasure in supporting the motion. He considered the Chairman had made out a very strong case for an increase.

Mr. Foster was sure whatever the Directors considered right and proper, the shareholders would also consider right and proper.

The Chairman assured the meeting that the sum was right and proper, and that they could not have a better officer than Mr. Bush.

The resolution was carried unanimously.

Mr. Frank Bush said he was very sorry that the meeting had had to hear so much about the Secretary; but he felt he could not allow the resolution to pass in silence. He thanked the shareholders very heartily for the kind way in which they had adopted the recommendation which had emanated from the Directors. He appreciated very highly the remarks that had fallen from the Chairman; and he was proud of the fact that he had been one of his lieutenants for a good many years, in assisting him and the Board in carrying out their policy. He again thanked the shareholders for the hearty way in which they had adopted the resolution, which was greatly enhanced by reason of the unanimity with which the motion had been received.

The Chairman said that concluded the business of the meeting.

Mr. Foster proposed a hearty vote of thanks to the Chairman and the Directors. He considered that the report presented that day was a wonderful one; and he was only looking forward to the time when the price of 2s. 1d. would be made into a round sum of 2s.

Mr. Hogarth seconded the motion, and expressed a sincere hope that the Board would remain firm in their determination not to enter upon arbitration with regard to the southern area proposed to be taken over.

The resolution was carried unanimously.

The Chairman, on behalf of his colleagues and himself, thanked the shareholders most heartily for the resolution. It was very pleasant to hear a suggestion come from a shareholder that he would like to see the price of gas further reduced. This was the right spirit; and he hoped that they would soon be able to do it. But he did not think it would be just yet, with the price of coal increasing. With regard to the remarks of the seconder of the resolution, it was also very pleasant to find the meeting unanimous upon the subject of the Board not going to arbitration. It was a great pleasure to the Directors to meet the shareholders, and it was a pleasure to them to have the hearty recognition of their efforts to serve the Company; and he could assure them that it would be a great stimulus to them in the future to do their best for the Company. It was very pleasant to attend these meetings; and they always looked back upon them with pleasure. It would not be proper to part without expressing the thanks of the Board, and of the meeting, to the officers of the Company. Mr. Hounsom had very feelingly and kindly alluded to the great loss which he (the Chairman) had sustained, and which the shareholders also had sustained. Their late Engineer devoted himself most thoroughly to the work of the Company—in fact, he (the Chairman) was afraid he had worked too long. They had now appointed as Chief Engineer Mr. C. C. Carpenter, previously Mr. Frank Livesey's deputy. He was a man who would do everything it was possible for an intelligent and able man to do. He had already spoken about Mr. Bush; and therefore he need not further refer to him, except to associate him with the staff. He believed they had a thoroughly loyal clerical as well as an engineering staff, who were anxious to make the Company the most prosperous one in the world. He ought not to omit to mention the rank and file—the foremen and workmen. Though there might be some among the officials who did not take that interest in the Company which it was expected they should take, there might be some in the working staff of whom the same might be said; but speaking of them as a whole the Board were extremely pleased with their loyalty, and he believed that with their hearty co-operation a still further height of prosperity was before the Company. He had great pleasure in moving a vote of thanks to the staff.

Mr. Robert Morton seconded the motion. Without dwelling upon all the officers, he should like to add his tribute to the memory of the late Engineer. He had known Mr. Frank Livesey for a great many years; and speaking from a professional point of view, he could say that that gentleman did not thrust himself forward outside his own Company, or inside perhaps. Yet he was a man of great ability; and by his removal they had suffered a very serious loss. He believed this loss would be made up to a great extent by the appointment of his successor.

The resolution was unanimously carried.

Mr. C. C. Carpenter, on behalf of the engineering staff, returned thanks. He said they had the benefit of knowing that the policy had been initiated and laid down by the Chairman when he was in a similar position as themselves, as an officer of the Company. They endeavoured to feel their way slowly in all improvements and modifications; and beyond this they tried to encourage as much as possible hearty co-operation, not only among the Engineers, but among the rank and file, to whom a great deal of their success was undoubtedly due. On behalf of the engineering staff, he wished to express their sympathy at the loss of a dear friend and a kindly fellow worker in the person of their late Engineer.

Mr. Frank Bush, in returning thanks, said he could not let this opportunity pass without saying a few words with respect to the loss which the Company had sustained by the death of his old friend and colleague, Mr. Frank Livesey. For eighteen years they had worked side by side; and he valued his friendship very much. Mr. Frank Livesey endeared himself to all his brother officers, and what was more to all the workmen. He was earnest and thorough in all that he did; and everyone felt that he had lost a sincere and true friend. He was quite sure of this—that the Company had lost a zealous and devoted officer.

The proceedings then terminated.

CROYDON COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present to the shareholders next Friday, on which day the 105th half-yearly general meeting will be held, they state that the total quantity of gas sold in the six months ending June 30 shows an increase of 3·62 per cent. on that of the corresponding period of 1898; and residuals, with the exception of tar, have realized better prices. There was an increase of 161 in the number of ordinary consumers, and of 458 prepayment and automatic meter consumers; making the total 13,880. There were 445 additional gas cooking and heating stoves fixed; making the number at present on hire, 5761. The accounts accompanying the report show that the revenue from the sale of gas in the past six months was £45,758; the rental of meters, stoves, and house fittings, £3211; residuals produced, £13,213; and the total receipts amounted to £62,261. The expenditure on the manufacture of gas was £32,514 (coal and oil costing £19,832); on distribution, £5686; on management, £2158; and the total expenses were £45,448. The balance carried to the net revenue account is £16,813; and the amount available for distribution is £17,021. The Directors recommend dividends at the rates of 14, 11, and 9 per cent. per annum on the various classes of stock, free of income-tax. These will absorb £15,447 of the above-named sum, and leave a balance of £1574. Under the supervision of Mr. J. W. Helps, Assoc.M.Inst.C.E., the Company's Engineer and Manager, 23,527 tons of coal and 261,309 gallons of oil were used in the production of 350,631,000 cubic feet of gas, of which 329,506,000 cubic feet were sold and 333,259,600 cubic feet accounted for. The estimated quantities of residuals produced were: Coke, 14,116 tons; breeze, 3804 tons; tar, 316,384 gallons; and ammoniacal liquor, 595,014 gallons—the make of sulphate being 233 tons, all of which, with 45 tons of the quantity in store, was sold.

PROVINCIAL GAS AND WATER COMPANIES.

Gas.

The half-yearly general meeting of the Bedford Gas Company was held on the 1st inst.—the Rev. Paul W. Wyatt in the chair. In their report for the six months ending June 30, the Directors stated that the period covered thereby had been successful in every particular. The quantity of gas sold had been 76,044,000 cubic feet, of which 3,780,000 cubic feet were consumed for street lighting in Bedford and Kempston. The two features of the half year had been the demand for cooking-stoves and the rise in the value of residuals. The works (under the supervision of Mr. T. Dann) had been kept in efficient condition. With regard to the accounts, after providing for bad and doubtful debts, and writing off as irrecoverable the large amount of £476, the Directors had to deal with £1747 14s. 10d. This, added to the amount brought forward (£1822 14s. 4d.), made a total of £3570 9s. 2d. Out of this the Directors proposed to pay the interest on debentures and loan, £260 12s. 6d.; dividends at the rate of 12½ per cent. per annum on the old stock and 9½ per cent. per annum on the new; to add to the insurance fund £466 1s. 4d., making this up to the full amount according to the Company's Act; and to carry forward the balance of £713 17s. 10d. The report was adopted.

At the meeting of the Bridport Gas Company, Limited, to-day, the Directors will report a profit of £1439 on the working in the twelve months ending June 30, including the balance brought forward. This enables the Directors to recommend the payment of 8 per cent. dividend on the ordinary shares, free of income-tax, and of 5 per cent. on the preference shares, less income-tax. This will absorb £937, and leave £502 to be carried forward. The manufacturing operations, under the management of Mr. J. H. Cornish, resulted in the sale of 13,266,300 cubic feet of gas for private consumption, and 1,500,000 cubic feet for public lighting; the former being an increase of 240,000 cubic feet.

The ordinary half-yearly meeting of the Cambridge Gas Company was held on the 31st ult.—Mr. E. H. Parker in the chair. The Directors reported that the trading for the past six months had been very satisfactory; and they recommended payment of the maximum dividends, less income-tax. They went on to say that carbonizing with inclined retorts had had a complete six months' trial, with the result that, notwithstanding upwards of 6 million cubic feet more gas had been made than during the corresponding period of last year, the wages were £252 less. With such satisfactory results, the Directors had decided to erect more of these retorts, and hoped that in the course of a few years the whole of the carbonizing would be done by this method. During the half year the Directors had had under consideration a report from the Manager (Mr. R. Brown) dealing with the enlargement and improvements at the works which he considered necessary to enable the increasing output to be efficiently dealt with. Although the Directors had full confidence in Mr. Brown's report, they felt that the advice of an independent expert would be appreciated by the shareholders; and they accordingly consulted Mr. George Livesey, who, except on one point, recommended the Directors to act upon Mr. Brown's advice. Mr. Livesey was also asked to give his opinion upon the general condition of the Company; and it was satisfactory to the Directors to learn that he approved of the policy which was being pursued. The Chairman, in moving the adoption of the report, said that generally the position of the Company was, he thought, satisfactory. They had sold nearly 6 million cubic feet of gas more than during the corresponding half of last year, and it had been produced at less cost by £252, by the introduction of inclined retorts. Owing to the new plant which was put down last year, the gas had been purified at a less cost of nearly £80, which was again very satisfactory. On the other hand, there was a serious rise in the price of coal, which was now 2s. 6d. per ton more than it was three years ago. This was a problem which had to be faced. Roughly speaking, the receipts had increased by £3190, and the expenditure £3049; showing a gain of £141 in receipts over expenditure. This was after providing for renewals, which cost close upon £2500. The balance of net profit from the last account was £12,680, which was subject to a dividend declared up to the 25th of December, and which absorbed £4452. This left a balance of £8227, to which had now to be added the amount from the revenue account, £6261; making a total of £14,488, out of which the present dividend had to be paid. All the defalcations had been settled, he believed—costs and everything else. Having dealt with the criticisms which had been passed upon the quality and price of the Company's gas, he went on to refer to Mr. Brown's report on the improvements necessary at the works, which will involve an expenditure of £30,000; and expressed the opinion that it was very creditable to the Manager that Mr. Livesey had, with one slight exception, confirmed it *in toto*. The Directors were accordingly going to carry out these improvements during the next five years. The amount chargeable to capital would be £16,000, and about the same to revenue. The report was adopted. Resolutions were then passed declaring the maximum dividend, and authorizing the creation of £10,000 of additional share capital and £32,000 of debenture stock—the latter to be applied in paying off the existing loan capital.

The half-yearly meeting of the Coatbridge Gas Company was held last Tuesday. Mr. J. Young (the Chairman), in moving the adoption of the report, which was noticed last week, commented on the very considerable increase which had taken place in the consumption of gas, which he said was 18½ per cent. more than it was for the corresponding period. He also expressed the hope that they would be in a position to continue selling gas at the present low rate of 2s. 6d. per 1000 cubic feet, even with coal remaining at the high price which had to be paid. The report was adopted, and maximum dividends at the rate of 10 per cent. per annum on the original stock and 7 per cent. per annum on the new shares (1877 and 1899 issues) respectively, less income-tax, were declared. According to a statement of gas manufactured and sold during the half year, prepared by the Engineer and Secretary (Mr. T. Wilson), the quantity of coal carbonized was 6409 tons 17 cwt., and it cost, on an average, 8s. 9d. per ton. The production of gas per ton of coal was 8566 cubic feet, of which 7587 cubic feet were sold; of green tar, 10·10 gallons; and of sulphate of ammonia, 27·79 lbs. The amount received for residuals, on the same basis, was: Coke, 1s. 7·98d.; tar and naphtha, 1s. 0·58d.; and sulphate of ammonia, 2s. 1·09d. The total cost of manufacture, distribution, &c., was £3926; being at the rate of 1s. 5·4d. and 1s. 7·37d. per 1000 cubic feet of gas made and sold.

The shareholders of the Littlehampton Gas Company held their annual meeting on Wednesday—Mr. Charles Barrett (the Chairman) presiding. The annual report showed that, after paying the usual dividends, there remained a balance of £64 on the year's working. The Chairman moved the adoption of the report, which he considered very satisfactory. He said the opinion appeared to be prevalent that the recent suggestion to make extensive improvements in the lighting of the town, coupled with the reduction of 2d. per 1000 cubic feet in price, was made as a counter-move to the proposal emanating from another quarter to supply Littlehampton with electric light. There was no ground for this opinion, as the Directors had discussed the matter before the electric light proposal was heard of; but the question was deferred until the Company saw how the accounts stood. They had lost money by paying a higher price for coal, and also by the flooding of the works; but it was hoped that, with careful management, the present reduction would be warranted. The report was adopted.

In the report of the Liverpool United Gas Company for the year ended June 30, the Directors state that the revenue was £562,963, and the expenditure £444,170; leaving £118,793. After deducting the amount taken for payment of the dividend declared last February, and the interest on the debenture stock, there remains £53,442, out of which the Directors recommend a dividend for the half year of 5 per cent. on the ordinary consolidated "A" stock, and 3½ per cent. on the 7 per cent. "B" stock. The Directors state that the prospects for the current year justify a reduction in price to 2s. 8d. per 1000 cubic feet for all gas supplied after the 30th of June.

The annual report of the Maidstone Gas Company shows a balance of £13,896; and the Directors recommend a dividend at the rate of 11 per cent. per annum (less income-tax), of which 6 per cent. will be payable on the 1st prox., the other portion having been paid as an interim dividend in March. At the meeting last Thursday, the Chairman (Mr. W. Hayes), in moving the adoption of the report, said the Company had every cause to congratulate themselves on the economical and efficient management of the works, which were thoroughly up to date. The net proceeds from the sale of coke and other residuals was 67·86 per cent.; while the increase of gas sent out had been 13 million cubic feet, against 9 millions in 1897-8. The cost of coal during the past year had exceeded that of the preceding year by £1954; but the returns from residual products had also largely increased. The report was adopted.

The half-yearly meeting of the Malton Gas Company was held last Wednesday. Mr. H. W. Pearson (Vice-Chairman) presided; and a dividend of 5½ per cent. for the half year was declared. The Chairman referred to the fact that from the 1st of July the price of gas had been reduced from 3s. to 2s. 9d. per 1000 cubic feet, but that meter-rents had been re-imposed, and rebates disallowed. This, with an increased coal contract, would cost the Company £360 per annum.

According to the report of the Directors of the Reading Gas Company, which will be presented to the shareholders to-day, there was in the past half year again a considerable increase in the total quantity of gas sold; while the receipts for residuals were largely in advance of those for the corresponding period of 1898, owing to the improved prices obtained for sulphate of ammonia and coke. The yearly contracts for coal have been entered into at such an advanced price as will materially increase the cost of manufacturing gas during the current year. There has been a large addition to the number of gas cooking-stoves let out on hire in the past twelve months. This branch of the Company's business has

now become a very important one, and the Directors have no doubt that it will largely increase in the future. Reference is made to the changes in the management of the works which have been already recorded in the "JOURNAL." Mr. Edward Baker, who for 35 years held the position of Engineer and Manager of the Company, has retired from active service; and, with the view of retaining his interest in the work of the Company, he has been appointed Consulting Engineer. The Directors greatly regret the ill-health which has caused his retirement, and most cordially recognize the very valuable services he has rendered the Company during his long term of office. Mr. Herbert E. S. Baker, who has for many years been engaged as Assistant Engineer and Manager, has now succeeded Mr. Edward Baker. The accounts accompanying the report show that the sale of gas to private consumers (157,519,800 cubic feet within, and 5,469,000 cubic feet beyond the borough) produced £22,293; that supplied to the public lamps (10,421,619 cubic feet), £1938; residuals returned £7670; and the total revenue was £31,951. The expenses of manufacture came to £20,469; of distribution, to £1945; and of management, to £1211—the total expenditure being £25,955. The balance carried to the net revenue account is £5996; and the amount available for distribution is £18,900. The Directors recommend the declaration of full dividends upon all the stocks and shares of the Company.

In the report of the Directors of the Waltham Abbey and Cheshunt Gas Company for the half year ending June 30, the Directors state that, compared with the corresponding period of 1898, the rate of increase in the sales of gas and residuals has been well maintained. The total quantity of gas sold was 18,340,900 cubic feet, which produced £3487; meter and stove rents brought in £298; residuals, £972; and the total revenue was £4759. The expenditure being £3120, there is a difference of £1639, of which £150 is carried to the suspense account, and £1489 to the profit and loss account. The sum of £2367 is available for distribution; and the Directors recommend that an additional ½ per cent. per annum dividend be paid on all classes of shares—making 7½ per cent. on the original, and 5½ per cent. on the additional capital. These, together with debenture interest, will require £1427, and leave £940 to be carried forward. Under the supervision of Mr. W. Bince Randall, the Company's Engineer and Secretary, 1964 tons of coal were carbonized; the estimated quantities of residuals produced being: Coke, 1228 tons; tar, 18,676 gallons; and ammoniacal liquor, 546 butts.

The Directors of the Weymouth Consumers' Gas Company, in the report to be presented to the proprietors next Thursday, state that the half year ending June 30 afforded another proof of steady progress in the business; the sale of gas showing a very fair increase. Residuals also produced a better return; but coal was more costly, and the price would be further increased in the current half year. The accounts accompanying the report show that the sale of gas for public and private lighting (33,244,000 cubic feet) produced £6293; residuals, £1254; and the total revenue was £7775. The expenditure being £5569, there is a balance of £2206. The sum available for distribution is £3947; and the Directors recommend a dividend for the half year at the rate of 5 per cent. per annum, less income-tax. Under the supervision of the Manager and Secretary (Mr. James Lowe), £1763 was expended on new buildings and plant in the period covered by the accounts.

At the half-yearly general meeting of the Willenhall Gas Company on the 2nd inst., the accounts presented showed a balance of £2186, which the Directors recommended should be appropriated in the payment of dividends of 5¼, 2¼, 4¼, and 4 per cent. respectively on the "A," "B," "C," and "D" shares. This would absorb £1428, and leave £758 to be carried forward. The recommendation was agreed to.

Water.

At the half-yearly meeting of the Brompton, Chatham, Rochester, &c., Water Company last Thursday—Mr. J. Baird, the Chairman, presiding—the Secretary (Mr. G. G. Catt) read the report, in which it was stated that on the 30th of June the capital, with premiums, stood at £101,087; and to this was added £10,000 derived from the issue of 1000 new "B" shares sold by auction. During the past six months, 1803 yards of 3 and 6 inch main pipes were laid, while 361 new services were connected to the Company's system. The additional revenue which will accrue from this is estimated at £252 per annum. The acquisition of the buildings, lands, &c., adjoining the Company's works at Luton has been practically completed; the Directors having paid over the sum named by the Arbitrator in the proceedings between the Company and Mr. R. D. Batchelor. The Directors recommended the payment of the maximum dividends, free of income-tax—*i.e.*, at the rate of 10 per cent. per annum on the "A" shares; and (from their respective dates of issue) 7 per cent. on the new "B" shares. The report and accounts were adopted.

The 83rd half-yearly meeting of the Chester Water Company was held last Thursday—the Chairman (Mr. W. Brown) presiding. The accounts for the six months ending June 30 showed a surplus of revenue over expenditure of £2808; while there was a balance of £5670 to be added from the previous half year. The interest on the preference capital required £450; thus leaving £8028. It was recommended that the usual statutory dividends should be paid, free of income-tax. This would absorb £1890, and leave a balance of £6138. The report of Mr. George Crowe, the Engineer, stated that the large filtering reservoir was completed; and that water of the highest degree of purity was being supplied to the city and districts. The Chairman, in moving the adoption of the report, pointed out that there was a greatly increased demand for the water. In the Company's prosperity, the Directors were pleased that the consumers should participate; and he had great gratification in announcing that from the end of the present quarter the second moiety in connection with the water for baths in residences would be removed from the accounts. This meant the large sum of between £700 and £800 a year; but still the Company could afford the concession. They were in a prosperous condition; and if they could go on perfecting the works, as they were able to do, they would have a water supply second to none in the kingdom. The motion was carried, and the usual statutory dividends were declared. The concession referred to by the Chairman means that the consumers will not be charged for the use of water for their baths.

The half-yearly meeting of the Leatherhead and District Water Company was held on the 3rd inst.—Mr. H. Rokeby Price in the chair. The Directors in their report stated that the receipts for the six months ending June 30 amounted to £2102, and the expenses to £1083; leaving a profit of £1019, or £256 in excess of that for the corresponding period of 1898. To this must be added £811 brought forward; making a total of £1830. Deducting £149, interest on debenture stock, there remained £1681 available for distribution. The Directors recommended a dividend at the rate of 5½ per cent. per annum. This would absorb £824, and leave a balance of £857 to be carried forward. During the half year, 53 new services were laid on; and applications for more were being received. The Company's Engineer (Mr. F. S. Cripps) reported that considerable additions had been made to the mains during the half year. The Chairman, in moving the adoption of the report, said it showed that the Company had made considerable progress; and they had every prospect of a further increase as they went on. Building was going on satisfactorily, and they were perpetually laying new mains to meet the demands for water. It was not at all unlikely that the Directors would have to ask the shareholders for further capital. Unfortunately, when they went to the Board of Trade for an Order to raise £25,000, for some extraordinary reason the amount was cut down to one-half—£12,500. The Company were under the obligation to supply water to their district; and the Directors would have to obtain further capital to meet this obligation. The report was adopted.

At the half-yearly meeting of the Stockport District Water Company, held last Tuesday, reference was made to the recent proceedings in Parliament. The Chairman (Mr. G. H. Hill) said that the receipts during the six months ended June 30 were £18,980—an increase of £1221 upon the corresponding period of last year; but this advantage was wiped out by a rise of over £1200 in the expenditure. The chief items of additional income were in water-rents; and the principal item of increased expenditure was £951 for additional water purchased from the Manchester Corporation, consequent upon the large number of new houses and other causes. There had been 226 million gallons received from Manchester during the past six months; being 22 million gallons more than in the same period last year. He moved the adoption of the balance-sheet, which showed that, after paying £1039 interest on debentures, the profit for the half year was £9483. The dividend proposed was at the rate of 7 per cent. per annum. The motion having been seconded by Colonel C. J. Howard and carried, the Chairman announced that the Stockport Corporation Water Bill had received the Royal Assent, and in this was contained parliamentary sanction to agreements made between the Company and the Manchester Corporation. The Company's Bill was withdrawn on the Royal Assent being given to the Corporation Bill. This was the understanding come to with Lord Morley, as the Company's Bill was simply to legalize the Manchester agreements. He did not himself question those agreements; but there was some doubt as to whether they could be properly carried out if they went into the Courts. The matter was now set at rest, because the Corporation had legalized the agreements in their Bill.

Reductions in Price.—The Colne Town Council have reduced the price of gas from 3s. to 2s. 9d. per 1000 cubic feet. The Liverpool United Gas Company have reduced their price to 2s. 8d. per 1000 cubic feet.

The Costs of the Scunthorpe Gas and Water Bill.—At the meeting of the Scunthorpe District Council last Thursday, the Clerk (Mr. F. C. Hett) stated that the cost of getting the Scunthorpe Gas and Water Bill through Parliament was £2200, the account for parliamentary printing alone amounting to £332 5s. It was decided to negotiate with the Public Works Loan Commissioners a loan for this amount, at 2¾ per cent., the payment to be spread over a period of ten years.

Serious Gas Explosion at Birmingham.—An explosion of gas, which did serious damage to the bedstead works of Messrs. C. Cartwright and Sons, Hertford Street, Birmingham, occurred last Wednesday night. The works were closed at six o'clock, when everything appeared to be in proper order. It is supposed, however, that some of the taps regulating the supply of gas to the japanning-stoves had been inadvertently left on, though how the gas became ignited is not known. The explosion happened shortly before half-past eight.

Contemplated Removal of the "Refreshment" Lamp in Leicester Square.—About this time last year, we recorded the erection, in Leicester Square, of one of the lamps of the "Pluto" Hot-Water Syndicate, for the supply, on the penny-in-the-slot arrangement, of hot water, beef tea, coffee, &c. It was remarked at the time that possibly, when the novelty of the lamp had worn off, its competition with the existing cheap refreshment establishments would be short-lived. There does not appear to have been any falling off in its attractions; and, in fact, it has caused the collection of such crowds of men and boys round it that, according to the "Daily News," the St. Martins-in-the-Fields Vestry have unanimously decided to give the proprietors three months' notice to remove it. Our contemporary thinks the Vestry are impatient, and suggests a multiplication of the lamps, which would mean a division of the crowds.

The Gas Supply of Athlone.—The Town Clerk of Athlone (Mr. P. V. C. Murtagh) has received official intimation from the Local Government Board for Ireland that the Treasury have sanctioned the loan of £4500 applied for to improve and extend the gas-works, in respect of which an inquiry was held on the 27th ult. (*ante*, p. 326). The works are in the hands of the Local Authority; but, although their price is the lowest in this part of Ireland—the average being 6s. 8d. per 1000 cubic feet—they are under-sold to the extent of 1s. by the Government, who maintain the Military gas-works in competition with the other undertaking. This unique state of affairs was brought under the notice of the Inspector (Mr. P. C. Cowan) on the occasion of the inquiry, and it was stated that immediate steps were to be taken to test the legality of the action of the Government. An indication that this was no mere threat was afforded by a notice given by Mr. Hayden, the member for Roscommon, in the closing days of the session, to ask the Under-Secretary for War to explain on what grounds the Military gas-works were placed in competition with the works erected and conducted by the Local Authority, for the supply of gas to the station and other premises of the Midland Great Western Railway Company; and whether it was in accordance with practice to place works erected with Imperial money for military purposes only, in competition with the enterprise of the Local Authority, whose profits, if any were made, would go to relieve local rates, while they bore the burden of any loss thrown upon them by competition. The honourable member, however, does not appear to have had an opportunity of putting his question; but certainly the matter requires explanation.

THE LONDON GAS COMPANIES AND A LESSON IN THE CREATION OF BOARDS.

A Suggestion from the "Financial News."

The following letter on this subject, from an anonymous correspondent, appeared in last Saturday's "Financial News":—

With regard to the report of the South Metropolitan Gas Company side by side with that of the Gaslight and Coke Company, and the question raised as to the advisability of purchasing the southern district gas-works from the Gaslight and Coke Company by the South Metropolitan Company, it might not be out of place to suggest the forming of that into a separate Company for the purpose of acquiring the gas-works, mains, meters, and other material of the southern district now supplied by the Gaslight and Coke Company. A system of comparison as to working results in the matter of new management, initial price for gas, and the sliding-scale operation could then be made, and would doubtless prove advantageous to the consumer; and the two existing Companies would, no doubt, be urged to effect further economies. A mistake has been made through the introduction of a huge monopoly; many Companies being amalgamated under the same auspices and a united Board, called the Chartered Company, whose policy has given rise for many years to comment in the matter of price and incompetence and general mismanagement. Directors of either of the above existing Companies ought not to be eligible upon the Board of the new Company. Year after year, as the members died off or became ineligible, the announcement should be made to the shareholders; and the names of eligible shareholders, with their present holding, submitted by post, as extracted from the register at a certain date. Any shareholder wishing to become a Director should send his name to the Secretary 48 hours at least before the names are submitted to the Directors, and nominated for election, if found qualified. Voting should be by ballot, and sealed proxies (if by post) put into the ballot-box on a day to be named, similar to other secret voting, so as to ensure fair play, as may be agreed upon by a Committee of three. Directors of the existing Board should not be allowed to vote, as it might often happen that their large holding would swamp an eligible man who, although he may be a competent person, has not inherited, or become possessed of, shares by fortune, but rather through the investment of his savings. By these means, in electing Directors you are likely to get new blood; and any shortsightedness of a policy of an effete Board would be checked. Many of the scandals of the proceedings of Directors are brought about through, year after year, allowing them to retain office, instead of retiring every third year; but under the Companies Act the shareholders, in the strict sense of the word, are powerless. Directors have always an eligible or friendly shareholder at hand in case of a vacancy, and their views or system are handed down; so that the most flagrant abuses are winked at, as in the Grosvenor Hotel and Millwall Dock Companies through the system of election under the Companies Act instead of making Directors out of the material of the shareholders holding *bonâ fide* interests. The fees of the Board are now looked upon as salaries, and a seat as if it were not to be challenged; so no interest is taken, as shareholders are outvoted, and looked upon as dummies. If all re-elections took place every third year, and through death or disqualification, and were open as above stated, the Director would look to his laurels just like a Member of Parliament to his suffrages before his constituents.

PROPOSED INCANDESCENT GAS LIGHTING IN LAMBETH.

At the last Meeting of the Lambeth Vestry, the Lighting Committee submitted a report in reference to the proposed adoption of incandescent gas lighting in the part of the parish served by the Gaslight and Coke Company. It appeared from the report that the Company were prepared to supply and fix for the public lamps the Brixton pattern cylinder lanterns, No. 4 incandescent burners, and fittings complete, for £3 10s. 9d. per lamp. They also offered to adopt and fit with a No. 2 incandescent burner each of the present old pattern lanterns, with fittings complete, for £1 13s. 9d. per lamp; also to light, extinguish, clean, and maintain the No. 4 burner lamps for £3 8s. 4d. per annum, and the No. 2 burner lamps at an annual charge of £2 11s. 8d. per lamp. It was proposed that the initial cost of about £1671 should be borne in the first place by the Company, and be repaid to them by the Vestry by equal quarterly instalments spread over a period of three years. The Committee, in pointing out that the gas in the particular district concerned was supplied to the public lamps on the average-meter system, expressed the opinion that it would be more satisfactory for a specified charge to be made at per lamp per annum, as suggested—a system which obtained in the case of the two other Companies supplying the parish. The Committee stated that although the initial cost was 20s. 9d. more in the case of new lamps with a No. 4 burner, and 13s. 9d. more in the case of altered lamps with a No. 2 burner, than the charge made by the South Metropolitan Gas Company, who were bearing a part of the initial cost in their district, the Committee recommended that the lamps (about 170) on the Albert Embankment, in Kennington Road, Lower Kennington Lane, Upper Kennington Lane, Stangate, and Westminster Bridge Road, should be fitted with the Brixton pattern lantern and No. 4 burner; and that all the other ordinary lamps (about 634) in the Gaslight and Coke Company's district should be adapted and fitted with a No. 2 incandescent burner—the new lamps to be fitted and the old pattern lanterns adapted for incandescent lighting, and all work in connection with same to be completed within twelve months. The charge for gas in the future would be the fixed sum per lamp as offered by the Company, subject to the ordinary rule, that, on all reductions in the charge for gas to ordinary consumers, the fixed yearly charge for public lamps should be reduced in proportion. It was estimated by the Committee that the adoption of the scheme as proposed would result in a saving of £300 per annum, apart from the improvement in the lighting of the streets comprised in the area named.

After a brief discussion, it was decided to adjourn the consideration of the report until after the recess.

GLASGOW GAS SUPPLY.

The Past Year's Working.

The report by the Committee on Gas Supply to the Corporation of Glasgow, for the year ending the 31st of May last, with the accounts for this period, were issued last week. In their report the Committee state that the gross revenue amounted to £700,149, and the gross expenditure to £574,967, to which is added depreciation written off capital, £36,793, and a further £15,400 depreciation written off the Dalmarnock station and works; making in all £627,160, and leaving a balance of £72,989 to be carried to the profit and loss account. The Committee had to meet the following requirements: Annuities on stock, £34,762; interest on borrowed money, £31,562; sinking fund, £6616—together, £72,940; leaving a surplus of £49 on the year's transactions. Adding the balance of £502 brought forward, there is a sum of £551 to be carried to the credit of the current year's account. The report then proceeds as follows.

Your Committee have pleasure in stating that the market for residuals has been more favourable to the Corporation, with consequent increase of income from this source; the average price received per ton of coal carbonized being 2s. 6·90d., as compared with 2s. 0·22d. in the previous year. The quantity of coke sold during the year was 240,832 tons, as compared with 186,101 tons in the previous year; the average price received being 5s. 0·68d., as compared with 5s. 0·75d. per ton.

Your Committee, as usual, advertised for tenders for coal to be supplied during the coming year, and have concluded contracts for the quantity required, at an increased price. Notwithstanding the higher price of coal, and an increase of wages to workmen, the Committee recommend that the price of gas be continued at the same rate as last year—viz., 2s. 2d. per 1000 cubic feet—in the hope that the favourable state of the market for residual products presently ruling may continue. The quantity of gas sold or accounted for during the year was 5,213,914,550 cubic feet; being an increase of 413,557,550 cubic feet, or 8·61 per cent.

The sinking fund, with its accumulations, now stands at £367,716.

The works and mains have been maintained in an efficient condition during the year. The extensions referred to in last year's report have all been completed, with the exception of the new gasholder at the Temple works, the construction of which has been delayed much beyond the specified time. It is hoped it may yet be completed before the coming winter. Parliamentary powers have now been obtained for the purchase of about 120 acres of ground on which to erect new works. Plans are in course of preparation; and it is hoped that the construction of the first section of the works will be commenced at an early date.

About 21 miles of new mains have been laid during the year. The number of meters in use on May 31 was 194,204; being an increase of 7877 over the number in use at the same date last year. During the year, 17,546 meters were repaired; 17,317 were examined while in use, of which 14,887 were found to be in a satisfactory condition, and 2430 were defective and were removed. The number of gas-stoves lent out on hire on the 31st of May was 15,021. The number of gas heating and cooking appliances sold during the year was 1632.

In accordance with the recommendation contained in the last year's report by the Committee, the Corporation promoted in the present session of Parliament a Bill for the purpose (*inter alia*) of authorizing the construction of new gas-works at Provan, and additional works for the manufacture of residual-products at Dawsholm, the formation of various railway sidings and roads of access, and the purchase of lands required for these purposes. The Bill was at first opposed by the North British and Caledonian Railway Companies, and by certain other petitioners. The opposition of all, however, was amicably arranged before going into Committee; and the Bill has now been passed into an Act under the short title of "The Glasgow Corporation (Gas and Water) Act, 1899." In anticipation of the Bill becoming law, arrangements were made with the proprietors of Easter Blochairn for the purchase of those lands, extending to 98 acres or thereby, at the price of £550 per acre; with the proprietor of the entailed estate of Milton, for the purchase from him of 9 acres of land or thereby at the price of £600 per acre; and with the Garscube Trustees for the purchase from them of the land required for the new residual products works at Dawsholm, at the price of £1100 per acre—these prices, in each case, to include the minerals in the lands. A remit has also been made to a Sub-Committee of the Gas Committee to confer with the Finance Committee of the Corporation with reference to the portions of the lands of Blackhill which will be required in connection with the construction of the new gas-works.

In the accounts accompanying the report (which is signed by Mr. R. M. Mitchell, the Convener), it is stated that the stock capital amounts to £415,000, upon which there is payable, in annuities, £34,762 10s.; and that of a loan capital of £2,000,000 authorized under the Acts prior to this session there had been borrowed £1,278,435—leaving £721,565. Of the sums borrowed, £188,435 was upon mortgage, bearing interest at 4 per cent.; but the whole has been redeemed. The remainder has been borrowed from the Corporation of Glasgow, at a yearly interest of £3 1s. 6d. per cent. Of the Corporation loans, £10,000 was redeemed during the year. The Dalmarnock station and works are entered at £77,673; the Dawsholm station and works, at £298,867, there having been expended £24,245 during the year; the Tradeston station and works, at £192,540, there having been expended £855; the Temple station and works, at £162,263, there having been expended £24,470; the Old Kilpatrick station and works, at £5255; the Pollokshaws station and works, at £2794; pipes and cost of laying, at £322,734, there having been added £21,649; gas-meters, at £178,306, there having been added £17,818; and gas-stove account, at £34,713. The total capital liabilities amount to £1,363,435; and the total capital expenditure, less depreciation upon properties, to £1,315,700—leaving a balance of £47,825. Of the revenue of £700,149, there was derived from the sale of gas £557,788; from coke, £49,932; from ammoniacal liquor and tar, £89,000; from waste lime, £732; and from rents of house properties and chemical works, £2688. Of the expenditure of £627,160, the manufacture of gas cost £489,379, of which coal (644,925 tons) cost £324,811; purifying materials, oil, water, and sundries at works, £27,910; salaries, £4834; wages, £76,896; and repairs and maintenance of works, plant, and tools, with materials and labour, £49,680.

The distribution of gas cost £55,019, of which the repair, maintenance, and renewal of mains and service-pipes, including materials and laying, paving, and labour, cost £28,978; and repairing and refixing meters cost £14,546. Rents and feu duties came to £6955; and rates, assessments, and taxes to £11,926. Management cost £10,515; law charges, £96; parliamentary charges, £756; and retiring allowances to old servants of the Companies amounted to £320. The depreciation allowed was as follows: On works and pipes, at 2½ per cent., £26,549; extra on Dalmarnock, £15,400; and on meters, at 6 per cent., £10,244.

THE STIRLING GAS COMPANY'S NEW WORKS.

An important scheme of almost entire reconstruction of the works of the Stirling Gas Company has just been completed. The Manager (Mr. J. D. Smith) has been in the post for just over two years. When he arrived in Stirling, the Corporation had defeated, or were in the process of defeating, the proposal for a transfer of the Company's undertaking to themselves; and the Company, on their part, were resolved to proceed with the reconstruction of their works, under parliamentary sanction. It fell to Mr. Smith, therefore, at once to apply his mind to the subject of the arrangement of the new works. The site was by no means an unsuitable one; and it possessed the valuable advantage of being close to the railway. The disposition of the buildings and plant upon it was, however, not such as would enable a manager with modern ideas to work with economy. Accordingly, the retort-house was razed to the ground; and the washing and scrubbing apparatus, the exhausters, and the station governor were sold and cleared out. The first point to be secured—and which, perhaps, became the dominant idea in the scheme of re-arrangement—was improved railway connection. A very favourable agreement was come to with the Caledonian Railway Company, under which the Company constructed a siding into the works; the elevation being such that, on entering the retort-house, which it traverses from end to end, it delivers the coal at a high level. The position of the retort-house being thus fixed by the railway, it was built close up to the eastern end of the site, having only the tar-well to the north of it. The house is built of brick, with a steel and corrugated iron roof. It is commodious and airy; the side walls being 24 feet high. The coal-store, with a capacity of 1000 tons, is arranged along the east side. The retort-bench runs down the centre, but does not go the whole length; there being room for extension. There are twelve ovens—six on each side—each containing six retorts, making in all 72 mouthpieces. In the old house there were 78 mouthpieces; but such is the advantage of improved methods of working, that last winter, with only 42 at work, more gas was made than used to be by the 78. The setting is a regenerative one, upon a simple principle designed by Mr. Smith, the efficiency of which is seen in the increased output, which during last year was 7 million cubic feet over the preceding year, and was the largest sale the Company have ever had. The hydraulic main has iron supports, and is altogether free of the retort-bench. The bench, again, is bound with tie-rods and binders, to prevent lateral expansion. In the centre of the bench is a square chimney, 85 feet in height. Between the retort-bench and the north wall are two steam-boilers, in duplicate. The gas is washed in one of Messrs. C. & W. Walker's purifier machines, which is capable of dealing with 750,000 cubic feet of gas per 24 hours. The brickwork was executed by Mr. C. M. Hamilton; and the other Contractors were: Retort-bench mountings and exhausters, and a new purifier box, 20 feet square, Messrs. Hanna, Donald, and Wilson; station-governor, Messrs. W. & B. Cowan, Limited; and photometer, Messrs. James Milne and Son, Limited. The Company being now under statute, the Corporation Gas Examiner tests the gas once a week; his visits being made without notice. The standard illuminating power prescribed is 21 candles; and the gas has never been under 25 candles. The new works occupy almost the same area as the old ones; and they are designed so as to leave room for an extension of the retort-house, and for the construction of a new gasholder, which cannot be long delayed, as the three existing holders are of only 320,000 cubic feet capacity, and the maximum daily output is 420,000 cubic feet. The works, taken as a whole, are admirably placed, and have been constructed at small cost. When it is added that the Manager occupies a house situated in a large and fertile garden inside the walls, it will be recognized that, now that he has got works to his taste, Mr. Smith's position is a comfortable one; and the Company's condition is such that, with the security they now have, through their Act of Parliament, and the advantages to be derived from their new works, they may look forward to a period of greater prosperity than they have yet experienced.

VISIT OF THE GATESHEAD CORPORATION TO THE REDHEUGH GAS-WORKS.

Last Wednesday, by invitation of the Chairman and Directors of the Newcastle and Gateshead Gas Company, the Mayor of Gateshead and the members of the Corporation inspected the Company's Redheugh works, where some of the plant is ready for the forthcoming winter. Having assembled at the Town Hall, the visitors at once drove to the works, where they were received by Dr. L. W. Adamson, the Vice-Chairman of the Company, and a number of the Directors and officials, including the Secretary (Mr. T. Waddom), the Engineer (Mr. W. Doig Gibb), and the Manager (Mr. T. Hardie). Immediately on arriving at the works, the visitors formed into two parties, and commenced an inspection of the large and well-appointed establishment. Being the height of the summer season, a great part of the plant was necessarily lying idle, owing to the small consumption of gas; but in midwinter their capacity will be tested to the utmost.

Having witnessed the whole of the processes, the guests partook of luncheon served in a marquee, where a complimentary toast list was gone through. Dr. Adamson proposed—"The Corporation of the County Borough of Gateshead." In doing so, he referred to the fact that the Company had recently entertained the Corporation of Newcastle, and regretted that their accommodation did not permit of the reception of both bodies at one time. He said that the Gateshead Corporation were fully conscious of the duties and obligations they owed to the constituents whom they represented; and the Company were equally conscious of their duties and responsibilities to the dual bodies with whom they were connected. They did their duty to the Corporations and the persons they represented; and next they considered their responsibilities to their own shareholders. So far they had done their duties to both these classes to the best of their ability; and they were now striving to discharge these duties even more effectually than hitherto. Their visitors had that day seen what the Company were doing. At the time the works were originally erected, they constituted the best methods of modern science. But time and tide waited for no man; and as the requirements increased and science progressed, they had to keep up with the times. He drew their attention to the extensions at the Redheugh works as an efficient effort to keep abreast of the scientific advance of the times; and he also mentioned the Company's enterprise in acquiring and equipping the new works at St. Anthony's. There the Company had obtained upwards of 65 acres of ground, on which they were erecting plant to supply a gasholder with a capacity of 5¼ million cubic feet. The new works at St. Anthony's would be absolutely unique in their up-to-date character. They were calculated to involve an expenditure of £300,000, and would be modelled after the best examples in the United Kingdom and on the Continent. He dilated on the extreme pains the Company had taken to get into line with the best practice in the construction and design of their new works at St. Anthony's, and paid a high compliment to Mr. Gibb for the perfection of the plans he had prepared for these works. Dr. Adamson subsequently referred to the relations of the Company with the two Corporations who were their customers, and to the way in which the Company met the objections and complaints of the Corporations. The Company, he said, could not always command and control success; but they deserved it. They did their best to supply the wants of all their customers; and he thought they showed enterprise in the success with which they met the demands made upon them. The Mayor of Gateshead replied to the toast, and expressed the pleasure with which the members of the Corporation had witnessed the wonderful progress and extensions of the Company's works at Redheugh. They all acknowledged that the Company were doing their utmost to meet the growing requirements of their constantly increasing district. Alderman Lucas proposed—"The Newcastle-upon-Tyne and Gateshead Gas Company," and gave the Directors credit for having done much to meet the requirements of the two Corporations, while at the same time paying due regard to the interests of the shareholders. Dr. Adamson having replied, other toasts followed; and the visitors then returned to the Town Hall.

THE PUBLIC LIGHTING QUESTION AT NEWMARKET.

The Gas Company's Tender Accepted.

At the Meeting of the Newmarket District Council on the 4th inst., letters received from the Gas and Electric Light Companies, submitting revised tenders for the public lighting of the town, were brought up. The Electric Light Company stated, in reference to the question of supplying 16 arc lamps of 800-candle power in High Street, and along Upper Station Road from the top of Vicarage Road to the White Lion, the cost per lamp per annum would be £15 10s.; the Company to provide the necessary posts, and all the lamps and other accessories. The lamps would be so arranged as to be turned off at four points. They would be similar to those exhibited in the High Street, and giving rather better light than those. A provision for all-night lighting by means of two 16-candle lamps on five of the arc-lamp posts would be made, so that these would give light when the arc lamps were not needed. The Company said they could not make any reduction in charge between the 800 and 1000 candle power arc lamps, as the difference in current was so small. The Company considered the 1000-candle lamps would best suit the Council's requirements, although they were of opinion that the Council would be satisfied with the 800-candle lamps. The letter from the Gas Company stated that the Council's letter of the 25th of July had been considered by the Directors, but they regretted their inability to light a portion of the district comprising the back streets, outlying roads, and Exning at the same price per lamp as the entire district, including High Street and Upper Station Road. Seeing that the Council appeared desirous of having High Street and Upper Station Road better lighted than the rest of the district, the Directors were willing, without any additional charge, to substitute in all the lanterns in these thoroughfares No. 4 Welsbach incandescent burners in lieu of the No. 3 burners offered in No. 3 tender (see *ante*, p. 246); thus bringing the lighting effect in the streets mentioned up to from 5170 to 5640 candles; and they were prepared to prove, by expert evidence, that these burners would give a light on the pavement and road of greater effect than the 16 800-candle electric arc lamps. Having regard to the fact that the amount of light offered was diffused from 31 lamp-pillars, the light, besides being greater in amount, would be more evenly distributed than that from 16 electric arc lamps at long distances apart. The cost of the 42 incandescent burners was only £144 18s. Considering all the circumstances, the Directors were reluctant to quote a relatively higher price for the outlying parts of the district. A higher quotation would be in every way desirable; and the motives of the Directors might possibly be misunderstood. They were, however, desirous to meet the wishes of the Council in every way, and they had no doubt the Council would prefer the concession of more light in the central part of the town, free of extra charge, rather than an offer to light only the outlying parts of the district at a somewhat increased relative cost. A long and, at times, somewhat heated discussion followed the reading of the letters. Mr. S. Westley said he considered the Gas Company should have the tender, as gas more evenly distributed the light than electricity. He failed to see why the High Street should be lit by 16,000-candle power, and other streets with far less. It was not fair to the other parts of the town. Mr. Dearsley said the Gas Company had offered to increase the lighting of the town at something like £100 less than the Electric Light Company, independently of the High Street. He claimed that the Gas Company's light was preferable and better than the electric light; and he moved that their No. 3 tender be accepted, with the additions and modifications as contained in their last tender.

Mr. Carr, in seconding the motion, said he brought forward the matter of inviting both Companies to tender some time since. The effect had been to stop the monopoly, as it had been freely called; and the result was that the Gas Company offered greatly increased light at £97 less than their previous tenders. Before, he had no hesitation in saying, the Council had a very bad contract; and now they were to have their light increased by five times, at nearly £100 less. Mr. Segrott criticized the tenders and actions of the two Companies. He said the Gas Company no doubt felt they could put pressure on the Council, as they knew the Electric Light Company had not their machinery ready to undertake at once the additional supply for the whole town. He referred to the fragile nature of incandescent mantles, and claimed that the electric light would be far better for the town. He should move, as an amendment, that the Electric Light Company's tender to light the High Street and Upper Station Road be accepted. Mr. Shephard seconded the amendment, which, however, was lost by three votes. The motion was then put and carried; the Chairman (Mr. W. B. Sheppard) and one of the members, who are interested as shareholders in the Gas Company, abstaining from voting.

ELECTRIC LIGHTING NOTES.

At last Wednesday's meeting, the Liverpool Corporation decided to apply for a loan of £300,000 to allow of the extension of the electric light undertaking.

At an extraordinary meeting of the Oswestry Electric Lighting and Power Company, Limited, held last Tuesday, a formal resolution was passed confirming the sale of the Company's business to the Oswestry Corporation, sanctioned at a previous meeting.

As was anticipated, the Exmouth District Council have decided to follow the example of some of their neighbours, and apply for a Provisional Order for supplying electric light. Some members of the Council resisted the proposal, fearful lest the town should be landed in heavy costs, like those incurred at Teignmouth. But the majority have no doubt on this or any other ground; and the application is to be lodged in due course.

At the Bradford Town Hall, last Wednesday, Mr. W. M. Ducat, one of the Local Government Board Inspectors, held an inquiry in respect to an application by the Bradford Corporation for sanction to borrow an additional £37,500 for electricity purposes. He said the Corporation already possessed powers to spend £185,194; and a few thousands of this sum had not yet been employed. The greater portion of the new loan was required for the improvement of the old electricity works in Bolton Road, and also for the extension of the new works; while £10,000 would be spent on mains and £1790 on public lighting. The Corporation originally proposed to borrow £45,000; but as this sum included an item of £8000 representing the value of the land which was already in their hands, they had adopted the view of the Board, and now applied for a loan of the amount stated. The Corporation Electrician (Mr. A. H. Gibbings) gave evidence in support of the application, to which there was no opposition. At the close of the inquiry, the Inspector examined the various plans submitted to him, and subsequently visited the works.

The foundation stone of the electric lighting station for Poplar, now being erected at Violet Road, Bromley, was recently laid by Mr. A. Valentine, Chairman of the Committee of the District Board of Works. The total cost of the scheme will be about £80,000. The supply will be by the low-tension continuous-current three-wire system. The first instalment of the engine and pump room equipment will consist of two 200 and two 100 kilowatt continuous-current dynamos, two 330 and two 165 brake-horse-power high-speed engines, four sets of surface condensing plant, two sets of transformers, switchboards, and all other electrical plant necessary in the works, together with a travelling crane capable of lifting 15 tons. As a first instalment, the Board have agreed to lay down about 20 miles of mains; and the principal streets will be lit by arc lamps, and the side streets by incandescent lamps. The light will be supplied under the maximum demand system; and the charges for the beginning will be 5d. per unit for the first hour's supply, 4d. for the second, and 3d. for all after. For power purposes, the charges will be 3d. for the first hour and 1½d. per hour after.

Devonport has undoubtedly stolen a march on Plymouth. After seeking in vain for a suitable site for an electric light station in Devonport, the Corporation have entered into arrangements for acquiring one just across the boundary line in East Stonehouse. The site is undoubtedly a good one, with a quay alongside which colliers may discharge; and if it will necessitate the laying of a rather long cable to the business centre of Devonport, it is, on the other hand, as close as could be desired to the main thoroughfare of Stonehouse. By obtaining this site, the Devonport Corporation get also the right to supply Stonehouse. They thus shut out Plymouth, from which the township now gets both gas and water. This is a triumph for Devonport diplomacy; but whether it will hasten or retard the movement—if it is a movement—for the amalgamation of the Three Towns remains to be seen. Under the provisional agreement between the Devonport and Stonehouse Councils, Devonport is to pay the cost incurred in obtaining a Provisional Order for Stonehouse, and is to go to Parliament to get it repealed and the area of supply in the Devonport Order extended so as to include Stonehouse. With regard to the terms and conditions of supply, Stonehouse is to be on the same footing as Devonport. On their part, the Stonehouse District Council undertake not to seek further powers for the supply of electric energy, and not to consent to anyone else acquiring them so long as Devonport properly discharges its statutory obligations.

The Wimbledon District Council had before them, at their meeting on the 2nd inst., a rather staggering report from the Electric Light Committee, recommending, among other things, that application should be made to the Local Government Board for sanction to an additional loan of £20,000. There was also a report upon the present condition of the electric light installation, which had been submitted to the Committee by Mr. A. H. Preece, the Engineer. This showed that the original loans were for £32,000 for the lighting portion, and £5000 for the destructor portion; making a total of £37,000. The present liabilities are about £47,000. In September last the Council agreed to an additional £3000 for mains, out of £5000 asked for. The extra expenditure had occurred under the following items: Buildings, £1500; machinery, £1000; mains, £6000; meters, £550; public lamps, £400; sundries, £550—total, £10,000. Mr. Preece said the time had arrived when the Committee must consider the extension of the generating plant. The present plant could supply electricity to about 8000 lamps of 8-candle power burning at one time. The public lamps already numbered over 1000, and would require the equivalent to 4000 lamps of 8-candle power. This left 4000 lamps for private lighting. The number applied for already reached 8000; therefore, allowing 50 per cent. to be burning at one time, it meant that the plant was fully loaded. Two additional engines, dynamos, and boilers should be provided for; and the buildings should be added to by erecting a new engine-room and offices. Further extensions to the mains were required every week; and there would also be a corresponding increase of expenditure in house connections, meters, &c. Mr. Penny asked that the proposed borrowing of £20,000 extra should be deferred. He said it was a very big item. To ask for £20,000 on the top of £32,000 before they had got a single street-lamp alight, or before they made even a penny out of the light, was a very extraordinary thing. His main reason for asking that the matter should be postponed was that he wished to know whether the Council had also to pay 5 per cent. on the extra £20,000 to the Engineer as had already been done on the £32,000. It was an important matter, and they ought not to "rush" it. It was eventually decided that Mr. Preece should be asked to prepare the plans for the extension at a commission of 2½ per cent. on the £10,000 required for the additional plant.

The Surbiton District Council recently held a special meeting to discuss the electric light question. Having rescinded all resolutions previously passed on the subject, the Council proceeded to consider the report of the Committee who have had the matter in hand. They came to the conclusion, having heard the offers of three competent firms, to recommend the Council to lease their Provisional Order to Callenders' Cable and Construction Company, Limited, on a basis submitted by them, subject to the satisfactory arrangement of minor details. The Contractors agree to take over the Order with all the obligations attached thereto, and find everything necessary for carrying out an efficient system of electric supply in accordance with the specification of the Council's Engineers, with the exception of the site and buildings, which will be provided by the Council—the Contractors paying the interest and sinking-fund charges on the capital cost from the date of commencing the supply. The charges are to be made on the Brighton system, and are not to exceed 7d. and 3d. per unit, with discounts, for private lighting, 2½d. per unit for public lighting and tramway purposes, and 3d. per unit for power. The Council are to have the option of taking over the works and plant at the end of 5, 7½, or 10 years. Mr. Lapage moved the adoption of the report. Mr. Judd pointed out that three Engineers whom the Council engaged to advise them had given their opinions adversely to the course it was now proposed to take; and he maintained that it would be the best thing to retain the control of the lighting in their own hands, for in the end it would be the least tax upon the ratepayers. The Company they were now negotiating with had reduced their terms to less than half those originally proposed. He moved, as an amendment, that the Council should retain control of the installation and the entire business in their own hands. Mr. Palmer seconded the amendment. Mr. Coochey agreed that the offer made was a very good one, but he said he should have preferred to sell the Order, and let the Company do just as they liked, provided they did not interfere with their street lighting, which was second to none in the kingdom. The lighting in Kingston was like a rushlight compared with the Surbiton incandescent light. He must say he had no faith in companies. Only the mover and seconder voted for the amendment; and the original motion was carried—Mr. Judd and Mr. Palmer dissenting. Mr. Coochey abstained from voting. The Clerk was directed to inform the Board of Trade that the Council had concluded a preliminary contract with the above-named Company, also to apply to the Local Government Board for sanction to the necessary loan (£25,000) to enable the Council to carry out the work.

THE SHEFFIELD CORPORATION AND THE DERWENT WATER SCHEME.

Thanks to Alderman Gainsford.

An interesting feature of the meeting of the Sheffield City Council last Wednesday was the recognition of the services rendered by Alderman Gainsford, Chairman of the Water Committee, and the officials of the Corporation, in connection with the proceedings in Parliament on the Derwent Water Bill. The matter was introduced by the Lord Mayor (the Right Hon. Alderman W. E. Clegg) moving—"That the best thanks of the Council, under the corporate common seal, be presented to Alderman Thomas Robert Gainsford, J.P., the Chairman of the Water Committee, for the very valuable services rendered by him to the city in connection with the Derwent Valley Water Bill." He said there had never been an occasion on which a vote of thanks had been more deserved, or better earned, than the one he had the pleasure of submitting. During the past eighteen months, Alderman Gainsford had been persistently at work in connection with the Derwent Valley scheme, and it was absolutely impossible to convey to the minds of members of the Council who were not members of the Water Committee the enormous amount of labour which the Chairman had voluntarily and gratuitously done. It was mainly in consequence of his admirable services that they were able to record one of the most notable parliamentary water victories of modern times. Alderman Franklin seconded the motion, which was supported by Alderman Styring, who said he had the honour of initiating in the Water Committee, some eighteen months ago, the proposal to endeavour to obtain a share of the Derwent Valley water. Sir H. Stephenson, as Vice-Chairman of the Committee, joined in the testimony to the high value of the services rendered by Alderman Gainsford. Alderman Eaton, in further supporting the resolution, emphasized the merit of the work done by the permanent officials, and said he was pleased to find on the minutes that some recognition of these efforts was about to be made. The vote having been unanimously accorded, Alderman Gainsford expressed his thanks for the honour done him by the Council in passing such a resolution, which he very highly appreciated because of its unusual character. Dealing with the work in which he had been engaged,

he said that when the Council entrusted to the Water Committee, and the Committee to the Sub-Committee, the charge of the Derwent Valley business, with almost unlimited power, he was anxious to consider it quietly, and not to lead the Council into a mess of any kind. The conclusion he came to was that the question really before them was not whether the water was required for their present population, but whether the water, which arose within 12 miles of Sheffield, which was to a large extent rising within their own limits and their own county, and which was the last area of supply available for Sheffield within a hundred miles, and upon which was dependent not only the present population, but one that before long would amount to 600,000 or 700,000 people, was to be absolutely and permanently taken away from them for the purpose of giving other places a supply which would last them for the next 80 years, leaving Sheffield dry at the end of 25 years. After once realizing the matter in this light, he never changed his mind; and the only question remaining was how to bring conviction of the fact to the members of a Parliamentary Committee. At first the odds seemed to be very much against them; but they succeeded because they did not attempt to put before the Committee any patched-up or varnished case, but convinced them from the beginning that what they were putting before them was the absolute, unvarnished truth. He was often asked how long the supply of water now secured would be sufficient for the wants of the city—what quantity exactly they had. He could not distinctly answer this question. He did not know precisely what the total quantity of water was, and he did not know how much would be required for Chesterfield, for example, nor what was the extent of the set-off which they had against the claims of Chesterfield, or any other outside body. It was stated before the Committee, however, that the water, if properly distributed, would probably last all the towns until somewhere about the year 1940. His impression was that this was something like correct—that there would be water enough to last them until about the year 1935 or 1940. At any rate, the Sheffield supply would not be exhausted before the others. With regard to the money value, there was only one way of estimating that. If they had lost the Derwent supply, not getting any water at all, they must have gone for their next supply to areas a hundred miles or more away; and they would have had to begin making works in such far-distant places within the next ten years, certainly. Was it an unreasonable estimate to say that the cost of water obtained in this way would be more expensive to the extent of 3d. per 1000 gallons? If not, it followed that Sheffield had gained by getting the Bill an amount of £35,000 or £37,000 per annum for the 25 or 30 years which the water would last. The Derwent water would be cheaper during this period to the amount of £35,000 per annum than water drawn from the greater distance. He hoped the Council would acknowledge that this result was worth the trouble they had expended. Alderman Gainsford concluded by complimenting the officials of the Corporation on the energy and ability they had displayed during the unusually protracted proceedings before Parliament.

At a subsequent stage of the proceedings, the services of several of the Water Department officials were duly recognized (as will be seen from to-day's "Personal" column) by an advance of salary to Mr. W. Terrey, the General Manager, and by gifts to others in the Town Clerk's office, varying from £50 to £250.

PLYMOUTH CORPORATION WATER SUPPLY.

The "Fyshinge Feaste"—The Burrator Reservoir and the Drought.

Owing to the construction of the Burrator reservoir, there was necessarily a change in this year's arrangements for the annual "fyshinge feaste" of the Plymouth Corporation, which took place last Wednesday. The Head Weir, the intake of the leat, has disappeared with much else connected with the historic water supply of the town; and the party assembled on another spot, not far distant, where the stream enters the reservoir. However, the toasts were the same, and "The pious memory of Sir Francis Drake" was duly honoured as that of the originator of the water-works which have served Plymouth, on the whole, so well for so many generations. The Mayor (Alderman J. Pethick) presided at the feast; and, in proposing the toast of "The Water Committee," said the water supply, although not in appearance what they could wish it to be, was second to none in the kingdom; and they had the guarantee that, notwithstanding the discoloration, it contained nothing injurious. Alderman J. T. Bond, Chairman of the Committee, in reply, said that but for the Burrator reservoir they would have had a water famine in Plymouth this year. The reservoir was made exactly in time. It enabled them, too, to save Devonport from the effects of the drought, for they were supplying 500,000 gallons a day to that town, as well as 100,000 gallons in addition to the normal supply to Stonehouse. During the year they had laid five miles of pipes in the extension of new and the renewal of old mains; and they had put in no fewer than 826 new house connections, which was the biggest number made in any one year. The scraping of a section of the main had enabled them to increase the delivery of the water without for the present incurring the expense of laying a second main. They had also tested the main from Burrator to Roborough, with the result that, after years of service, it was found absolutely free from leakage. As to the colour of the water, the Committee did not expect that it would be possible to cover more than 100 acres of land with water and then find, when they came to draw it off, that the colour was unaffected. An analysis was made every week. Each showed that the condition of the water was improving; and it was then absolutely free from anything in the nature of impurity. The number of connections to new houses increased from 239 in 1891 to 826 in 1898; while the number of trade supplies had gone up from 87 to 219, and the number of meters from 125 to 600. The revenue, which in 1891 was £13,600, was this year estimated to reach £21,250; and he believed it would exceed that sum. The Town Clerk (Mr. J. H. Ellis), in responding to the toast of "The Borough Officials," defended the policy of the Town Council in the construction of the Burrator reservoir, and other matters, on the ground that it was a policy of true economy. Mr. E. Sandeman, the Water Engineer, also replied to the toast, and said the difficulties incidental to the new works had been aggravated by having to provide a supply of water for an exceedingly hot summer. The drought had been so severe that already 150 million gallons had been drawn off the quantity of water in store. If the dry weather lasted till the end of September, they would then have 300 million gallons in reserve.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 417.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 13	10½	Alliance & Dublin 10 p. c.	21½—22½	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	15½—16½	..	4 10 11
800,000	100	July 3	5	Australian 5 p. c. Deb.	102—104	..	4 16 2
200,000	5	May 12	6	Bombay, Ltd.	6⅛—6⅜	..	4 8 11
40,000	5	,,	6	Do. New, £4 paid	4½—4⅝	..	5 1 1
380,000	Stk.	Feb. 24	12	Brentford Consolidated	275—280	..	4 5 9
270,000	,,	,,	9	Do. New	215—220	..	4 1 10
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb.	126—130	..	3 1 7
220,000	Stk.	Mar. 29	11½	Brighton & Hove Orig.	260—270	..	4 5 2
226,320	,,	,,	8½	Do. A. Ord. Stk.	194—197	..	4 6 4
973,500	Stk.	Feb. 24	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Mar. 29	10	British	45—47	..	4 5 1
50,000	10	Feb. 24	12	Bromley, Ord. 10 p. c.	25—27	..	4 8 11
75,000	10	,,	9	Do. 7 p. c.	20—22	..	4 1 10
500,000	10	Apl. 27	6	Buenos Ayres (New) Ltd.	10—10½	..	5 14 3
220,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29*	..	5 13 10
100,000	10	June 1	7½	Cape Town & Dis., Ltd.	13—14	..	5 7 2
50,000	50	May 2	6	Do. 6 p. c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Apl. 13	13½	Commercial Old Stock	316—321	..	4 4 1
200,750	,,	,,	10½	Do. New do.	245—250	..	4 4 0
200,750	,,	June 15	4½	Do. 4½ p. c. Deb.	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	187—192	..	5 4 2
200,000	,,	,,	7	Do. 7 p. c. Pref.	182—187	..	3 14 10
51,600	Stk.	Feb. 24	14	Croydon A 10 p. c.	—	—	—
168,400	,,	,,	11	Do. B 7 p. c.	—	—	—
555,000	Stk.	Feb. 24	5½	Crystal Palace Ord. 5 p. c.	135—140	..	3 15 0
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.	22¾—23½*	..	4 13 7
354,060	10	,,	11	Do. £7 10s. paid	16—17*	..	4 17 1
14,993,075	Stk.	Feb. 10	4 9/10	Gas-light and Coke	4 p. c. Ord.	108—110	+½	4 9 1
					3½ p. c. max.	96—100	..	3 10 0
					4 p. c. Con. Pref.	126—128	..	3 2 6
					3 p. c. Con. Deb.	99—101	..	2 19 5
2,500,000	,,	,,	3½					
3,799,735	,,	,,	4					
2,993,975	,,	June 15	3					
70,000	10	May 31	8	Hongkong & China, Ltd.	13½—14½	..	5 10 4
3,800,000	Stk.	May 13	10	Imperial Continental	223—228	..	4 7 8
473,600	Stk.	Feb. 10	3½	Do. 3½ p. c. Deb. Red.	102—105	..	3 6 8
75,000	5	June 15	6	Malta & Medn., Ltd.	5—5⅛	..	5 9 1
560,000	100	Apl. 4	5	Met. of Melbourne	5 p. c. Deb.	112—114	..	4 7 9
					4½ p. c. Deb.	110—112	..	4 0 4
250,000	100	,,	4½					
541,920	20	May 31	5	Monte Video, Ltd.	12⅜—13½	..	7 8 1
617,946	Stk.	Feb. 24	9½	Newc'tle & Gatesh'd Con.	228—233	..	3 19 5
264,855	Stk.	June 29	3½	Do. 3½ p. c. Deb.	106—109	..	3 4 3
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd.	7½—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6½—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—1⅝	..	4 11 5
60,000	5	Mar. 29	7	Ottoman, Ltd.	5½—6	..	5 16 8
500,000	100	June 1	6	People's Gas of Chicago 2nd Mtg. Bonds	102—106	..	5 13 2
851,070	10	Apl. 27	7	River Plate Ord.	11½—12	−¼	5 16 8
250,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
250,000	10	Mar. 29	10	San Paulo, Ltd.	16½—17½	−½	5 14 3
135,000	Stk.	Mar. 29	10	Sheffield A.	244—249	..	4 0 4
209,053	,,	,,	10	Do. B.	244—249	..	4 0 4
447,427	,,	,,	10	Do. C.	244—249	..	4 0 4
5,600,000	Stk.	Feb. 10	5⅛	South Metrop., 4 p. c. Ord.	142—145	+1	3 13 6
1,460,000	,,	July 13	3	Do. 3 p. c. Deb.	101—103	+1	2 18 3
120,000	Stk.	—	6	Tottenham A. 5 p. c. and B. 3½ p. c.	143—145	..	4 2 9
250,520	,,	—	4½		103—105	..	4 5 9
55,100	,,	—	4	Edmonton 4 p. c. Deb.	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	−2	3 9 2
150,000	,,	,,	5	Do. 5 p. c. Pref.	167—170	..	2 18 10
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	148—153	..	2 18 10
175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb.	155—160	..	2 16 3
1,720,560	Stk.	Apl. 13	7	East London, Ord.	214—219	..	3 3 11
654,740	,,	June 29	4½	Do. 4½ p. c. Deb.	155—158	..	2 17 0
890,000	,,	,,	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p. c. max.	111—114	..	3 5 9
310,000	Stk.	Mar. 29	4		4 p. c. Deb.	135—140	..	2 17 2
708,000	Stk.	Feb. 10	14	Kent	362—367	+2	3 16 4
160,000	,,	,,	7	Do. New, 7 p. c. max.	210—215	..	3 5 1
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max.	298—303	..	3 9 4
406,200	100	,,	8	Do. 7½ p. c. max.	225—230	..	3 9 7
350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
500,000	100	Feb. 11	13⅓	New River, New Shares	430—435	..	3 3 3
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb.	135—140*	..	2 17 2
902,300	Stk.	June 15	7½	South-wark and Vauxhall Ord.	200—205	..	3 13 2
126,500	100	,,	7½		7½ p. c. max.	193—198	..	3 15 9
489,200	Stk.	,,	5		5 p. c. Pref.	167—172	..	2 18 2
1,019,585	,,	Apl. 13	4		4 p. c. A Deb.	135—140	..	2 17 2
1,155,066	Stk.	June 15	10	West Middlesex	295—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb.	154—158	..	2 17 0
200,000	,,	Mar. 10	5	Do. 5 p. c. Deb.	102—104	..	2 17 8
				* Ex. div.			

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The revolving year has brought forth the annual report by the Gas Committee of the Corporation of Glasgow, with the annual accounts of the department. The undertaking is the largest of its kind in Scotland; and there is pleasure in noting that the huge snowball goes on increasing year by year. This year's revenue of £700,149 is the largest ever earned. Next to it comes the preceding year, with £631,644. The next highest, again, was 1894-95, when £629,362 was earned; but in that year the price of gas was 2s. 6d. per 1000 cubic feet. It is interesting to note how a reduction in price promotes business. In 1895-96 the price was reduced to 2s. 4d., and the revenue amounted to £605,794; and in 1896-97 the price was reduced to 2s. 2d., and the revenue rose to £607,622. It has since remained at 2s. 2d.; and I have given the revenue above for the past two years. An abstract shows that no attempt has been made to redeem the annuities which are payable to the holders of stock in the old Gas Companies, and which, since the transfer, in 1869-70, have remained at £34,762; the stock standing all through at £415,000. But there is a sinking fund, available for the redemption of mortgages or annuities, amounting to £367,716. Mortgages, which in 1874-75 amounted to £650,999, were all paid off in 1895-96; and Corporation loans, which began in 1885-86 at £60,000, now amount to £563,000—sums of £98,500 out of £661,500 borrowed having been redeemed under the operation of the statute of 1869. It may be observed that, while the price of coal has advanced by £52,047 over what it was in the preceding year, the revenue from the sale of gas has increased only £41,076. It is, as the report indicates, in the enhanced return for residuals that the profit has been made. The increase in the revenue from ammoniacal liquor and tar was £21,568. On the other hand, had there not been the extraordinary increase in the quantity of coke sold of 54,731 tons, there would have been a decrease under this head. As it was, there was an increase in the amount, of £1545.

But these are merely details in the working of a gigantic undertaking. The general feature is that there is a continuous and rapid advance in the business of the department. This, of course, is largely owing to the flourishing of the trade and commerce of the city of Glasgow. Without that, indeed, the prosperity of the Gas Department would be non-existent. But general municipal prosperity does not account altogether for the prosperity of this particular department. It is the conduct of itself which is the chief cause of the onward movement. That the undertaking is steered, and is not being carried forward by controlling events, is shown—or rather instinctively felt—by a glance at the accounts generally. The marshalling of the various items, the balancing of the one with the other, and the general uniformity of result, one year with another, in many of the items, is sufficient testimony to the view that chance plays a comparatively small part in the fortunes of the Glasgow Corporation Gas Department. It is directed, and directed by a firm and a skilful hand. Were it otherwise, the consequences would be disastrous; but, being as it is, we have no call to consider the other way. We can but contemplate with satisfaction the excellence of the management and the onward march of a great municipal enterprise.

"All is not gold that glitters." This truth is borne home upon my mind by a circumstance which has come under my knowledge relative to the tenders which were recently submitted to the Edinburgh and Leith Gas Commission for the erection of a new gasholder at Granton. The successful tenderers were Messrs. Clayton, Son, and Co., Limited, who obtained the contract for £43,315. The highest offer of all was, I learn, lodged on behalf of Messrs. R. D. Wood and Co., of Philadelphia. They were prepared to do the work for £58,000, which is £14,685 above the price of Messrs. Clayton, Son, and Co. A year-and-a-half ago the world was being kept informed that Messrs. Wood and Co. were able to supply iron goods in this country at about 8s. per ton cheaper than they could be furnished by home manufacturers. There was a flutter among manufacturers here, and among those who require to purchase large quantities of gas or water piping; the one party viewing with dismay the prospect of their business drifting away from them, and the other regarding the new state of matters with more exultant feelings. The sensation has, on both sides, been short-lived. From about 13 per cent. lower to 25 per cent. higher is a wondrous leap for the American firm to take. Whatever they may have been doing when they first became manifest in commercial life on this side of the Atlantic, on this occasion they did not go into the matter with their eyes in any way unopened to the whole circumstances under which they were tendering. They were furnished with the same drawings and specifications as were the other tenderers; and I suppose they worked by the same multiplication table—or perhaps they have discovered a new one in America, a sort of sliding-scale table which can be adapted to suit the market. At all events, it has either not suited this particular American firm at this time to underbid British manufacturers, or they have not found themselves in a position to do so. The latter is the more probable supposition of the two. There is thus, it would appear, room for the old country in the world yet. It would be a mistake to mope over the loss of a few contracts to a foreign firm; and home manufacturers, to their credit be it said, did not put themselves greatly about in the matter. It is perhaps just as well, seeing it is the other way, that we should not seek too much to humiliate a rival, but should content ourselves with the reflection that we are, as a commercial nation, not yet played out; and that we should rest upon the fact that, old as the world is, it stills needs to be reminded occasionally that things are not always what they seem to be. It is likely to be the truth of this matter that the former tenders by the Messrs. Wood were made for a purpose, and that this purpose having been served, there is no more necessity for parading cheap prices, and therefore the tender just submitted is nearer the true state of matters than were those of last year.

The Gas Commissioners of Falkirk, it appears from remarks which were made (incidentally, it is true) at their last meeting, have abandoned the suggestion of Mr. Kincaid, their Manager, that they should transfer the gas-works to a new site. The subject came up on a suggestion by Mr. Kincaid that a new scrubber-washer should be provided, at a cost of £720. In his report, Mr. Kincaid said: "The present scrubbing plant

C. & W. WALKER, LTD.,

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE.

110, CANNON STREET, LONDON.

Telegraphic Addresses: "Fortress, Donnington, Salop;" "Fortress, London."
Codes Used: A.B.C. and A1.

GASHOLDERS

GADD & MASON'S SPIRAL-GUIDED HOLDERS.

PURIFIERS. VALVES. SCRUBBERS.

PURIFYING-MACHINES FOR REMOVING AMMONIA.

Carbonic Acid and Tar Extracting Washers.

SULPHATE OF AMMONIA PLANT.

CLAUS' PATENT SULPHUR-RECOVERY PLANT.

SELF-SEALING RETORT-MOUTHPIECES. LIFTING APPARATUS. CENTRE & FOUR-WAY VALVES.

MAKERS OF WECK'S PATENT CENTRE-VALVE.

TAR-DISTILLING PLANT. CONDENSERS. WOOD SIEVES.

TAR-BURNERS. ROOFS. GIRDERS, &c., &c.

Makers of Cripps' Patent Grid Valve and Hydraulic Main Valve.
Makers of Holgate's Patent Gas-Purifying Plant.
Makers of Tysoe's Patent Self-Sealing Mouthpiece.

is very deficient, and altogether inadequate for present requirements. It consists of an old boiler, 12 feet high by 6 feet diameter, connected to a Tangye's pump, and a tower scrubber, 40 feet high by 6 feet diameter. The washer is useless. The scrubber is too small, and, in addition, cannot be used to advantage; it being necessary to curtail the supply of water owing to defective washing. Otherwise the liquor would become of little commercial value. As a consequence, the purifiers, which are already too small, are taxed beyond their powers; and it is only with great difficulty that gas free from impurities can be sent out during the winter. Owing to the cramped condition of the works, I would recommend that the disused oil-gas meter be removed, and a scrubber-washer of the vertical type erected on the site, and connected to the existing pipes. Messrs. W. C. Holmes and Co., of Huddersfield, have offered to erect one of their patent new scrubber-washers capable of dealing with 1 million cubic feet of gas per diem. This will cost, with steam-engine, gearing, connections, and foundations complete, about £720." Mr. Kincaid got his way; and the order to Messrs. Holmes was sanctioned. With this, no one has any quarrel. I hope the apparatus will prove in all respects equal to the expectations which have been formed of it; but it is another matter when a gas manager, in the recommendation of one process, takes to the disparagement of another—there being almost no connection between the two systems. What I complain of is that Mr. Kincaid put himself out of his way to say: "It is impossible at present to profitably manufacture oil gas; and the manufacture of it has been given up in all places in Scotland at present." Where did Mr. Kincaid get his information? or what was the meaning of his words? Of course, he alludes to the Peebles oil-gas process, which was in use at Falkirk. If Mr. Kincaid meant to say that the process was not being worked during the summer months anywhere in Scotland, that might be correct; but if his meaning was that the system had been abandoned all over Scotland, he was grievously in error. The process, it is true, is not so profitable now as it was in the days of dear cannel. But it is to this system that gas managers ought to attribute the fall in the price of cannel; so that to say, as some of the Falkirk councillors—not Mr. Kincaid—did, that it had been a failure, is not correct. It is now, when coal is again rising in value, that the benefits of the process will be seen; and those bodies who, like the Corporation of Falkirk, allow themselves to be pursuaded by a new Manager that the plant he found in the works when he took office was valueless, will find, in the case of the Peebles system, that they have committed a blunder. A better policy on Mr. Kincaid's part would have been to have tried the oil process first; and only in the event of his finding it wanting should he have thrown it aside. I might point out that Mr. Kincaid's predecessor in Peterhead (Mr. J. Mackay) acted in a different spirit from him. Mr. Mackay was experimenting on oil-gas making at Peterhead, and appeared to be in a fair way to success when the Peebles process was announced. Perceiving the superiority of this system over his own, Mr. Mackay went no further in his researches. Mr. Kincaid may have done what he did without thinking he was stepping aside; and if so, he will doubtless pardon his action being called in question. He is doing well in Falkirk, where, as everyone knows, he has an uphill task before him; but I do think that if it had been at all possible to have selected another site for his scrubber-washer, he ought to have done so, and not to have thrown out plant which, with the royalties which the Commissioners commuted, it was stated cost them £1000, and that only a few years ago. It is scarcely business. At the very least, he should surely have worked out the plant.

At a meeting of the Gas Committee of the Greenock Police Board on Thursday, it was reported that the net surplus on the year's working was £365. During the past year the employees have been granted increases in their wages amounting to nearly £1000; while 1d. per 1000 cubic feet was taken off the price of gas at the beginning of the financial year. More coal has been used at the gas-works; the extra outlay being £2000. During the year an increase of 10 per cent. in the gas consumption is reported.

To fill the vacancy on the Gas and Electricity Committee of the Aberdeen Town Council, created by the resignation of Mr. Johnston of the convenership, Mr. Watson has been made a member of the Committee, and Mr. Kemp has been appointed Convener. Mr. Kemp, judging from the remarks of his nominator, seems to be one of those men, of whom there are many examples, who enter public life with ultra-reforming—sometimes called fire-eating—proclivities, but who find, after taking up office, that matters are, after all, not so bad as they imagined; who then settle down into solid, hard-working representatives; and who, from being suspected, become admired. Such a man usually develops into a valuable public representative. Mr. Kemp was complimented upon this—that while there were some things on which they (the majority of the Town Council, I presume) never agreed with him, no one ever disputed his capabilities for carrying on municipal work. The appointment was made unanimously; and so, if Mr. Kemp has the administrative talent with which he is credited, he should receive the support of the Council.

The Town Council of Aberdeen, on the look-out for an augmentation of the water supply of the city, should that become necessary or advisable, recently paid a visit to Inchrory, on the Avon—one of the tributaries of the River Spey—from which it is proposed to derive the water. The party travelled by train to Dufftown, from whence they drove to Tomintoul, the highest village in Scotland—1150 feet above sea-level. There the night was spent; and next day the visitors drove and walked to Inchrory, a distance of nine miles, through a country the hilly nature of which is such that it took nearly four hours to traverse. From Inchrory, a walk of four miles, through a country inaccessible to vehicular traffic, brought the party to a place where carriages from Deeside were in waiting for them. At the end of the drive, train was taken at Ballater for Aberdeen, which was reached in the evening. The Councillors were highly pleased with the quality and abundance of the water; and consideration will now be given to the question of whether or not a scheme will be promoted for its appropriation. Intimation has already been received from the Duke of Richmond and Gordon that determined opposition will be offered to any scheme which the Council may promote for taking water from the Avon to Aberdeen. But the most interesting incident of the visit was a speech which was made by Sir Charles Forbes at a luncheon which the visitors partook of in one of the Baronet's shooting-lodges.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.,	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE	150,000

AND ADDITIONAL WORK.

Acknowledging the toast of his health, Sir Charles said that whether the proposed scheme was feasible, practicable, or possible in itself he did not know; all he knew was that the difference of level between the Avon and Aberdeen was 1500 feet. If they dropped a river some 1500 feet, it did some work on the way, and he did not see why that work should be wasted. Last year he looked into the question of manufacturing carbide of calcium in that glen; but he came to the conclusion that, if the power of the Don were used—owing to the fact that only 1000-horse power could be reckoned upon, and also in conjunction with the fact that there was no other object for which water could be employed—the scheme would be too expensive. At the same time, he had the limestone of the district analyzed, and was told that the limestone of Corgarff was just the stuff for making carbide. If such an amount as 3000-horse power could be got from the water which was going to pass from the Avon to Aberdeen, a sum of something like £15,000 could be realized by the Town Council in interest, without running any risk, for this reason—that the people who had works at Foyers were quite capable of putting up their electric machinery and furnace, but had not money to make the water-power scheme. They had been trying to make such a scheme in Wales; but owing to certain difficulties that had arisen, they had been unable to come to terms. The price at which carbide was sold was now £18, and was lately £20 per ton; and the cost at Foyers came out to about £7 10s. They would see, therefore, that there was profit in the manufacture. Of course, he did not know how much water they were to take to Aberdeen; the whole thing lay in the fact of whether there was sufficient water going to be used or passed from the Avon, because nothing under 1000-horse power was of any use.

The heat-wave has reached Scotland. During the past fortnight it has been intensely hot; but not by any means sultry. One effect has been an extraordinary increase in the consumption of water. From Edinburgh, it is reported that during the second half of July there was a decrease in the quantity of water in store of more than 124 million gallons. The average daily supply was not large, either; being only 40·77 gallons per head per day. The rainfall has been ample; having been, since the 1st of January, 25·80 inches, as compared with 13·68 inches in the same period of last year, and 17·33 inches in 1897.

The annual accounts of the Water Department of the Glasgow Corporation show that during the past year the revenue from assessments amounted to £207,784, that from hydraulic power works to £5001, and that from river supply works to £3959—a total of £216,744—which, added to the credit balance from the previous year of £39,772, made the total £256,516. The expenditure, including annuities and interest, amounted to £146,270, for hydraulic power works £5468, and for river supply works £3813—a total of £155,551. There was carried to the sinking fund accounts £58,428; and a balance carried to the credit of revenue account of £42,537. The details of the revenue, as compared with the previous year, are: Domestic water rate, within the municipality (less abatements), £47,486, increase £1491; domestic water rate, without the municipality (less abatements), £22,629, increase £1661; public water rate, £18,479, increase £506; trade charges, within municipality, £25,892, decrease £4880; do., without municipality, £5203, decrease £381; meter supplies, within municipality, £62,404, increase £3773; do., without, municipality, £20,470, increase £1329; builders, £2391, decrease £143; rate for cost of pumping water, £997; increase £188; arrears, £102, decrease £13; costs, £364, decrease £15; ground annuals, rents, &c., £773, decrease £3; testing and stamping department, £587, increase £54; hydraulic power supply works, £5000, increase £1530; river supply works, £3959, increase £274. The total revenue for the year was £216,744, and for the previous year £211,372—an increase of £5372. The total expenditure for last year, exclusive of the sum carried to the sinking fund, was £155,551; while the total expenditure for the previous year, exclusive of the sum carried to the sinking fund, was £155,084—an increase of £467. The amount expended on new works during the year was £63,929, while the capital expended on the new works now being constructed amounts to £1,373,821. The sinking funds set apart for the redemption of annuities, and in repayment of moneys borrowed in terms of the Acts, now amount to £955,133. In view of the satisfactory state of the revenue account, the Corporation on April 20 reduced the domestic water-rate within the city to 5d. in the £1.

The accounts were approved at a recent meeting of the Town Council, on the motion of Mr. Carswell, who stated that the supply of water sent into the city and district during the year ending the 31st of May averaged as follows: From the Loch Katrine works, 48,833,408 gallons per day; from the Gorbals works, 4,665,719 gallons—together, 53,499,127 gallons; as against an average for 1897-98 of 51,450,868 gallons—an increase of 2,048,262 gallons. The use of the hydraulic power water continued to increase. The quantity of water supplied averaged 69,341 gallons a day—a rise of 26,684 gallons. The quantity of water from the river supply works averaged 3,028,889 gallons a day—an increase of 248,189 gallons.

In last week's "Notes," it was stated that the Glasgow Corporation had this year departed from their usual practice, and divided their gas-meter order among several firms, one of them being Messrs. James Milne and Son, Limited. We are informed that the firm in question will have one-third of the order, as in previous years.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 12.

Sulphate of Ammonia.—The improved inquiry reported last week has been accentuated during the present one; and requirements having become pressing, buyers were finally obliged to concede makers' terms, with the result that good business has been done, not only for prompt, but also for forward delivery. Most of the business has been put through at about last week's quotations; but in the sensitive condition of the market, due to restricted supplies, prices have been quickly affected, and quotations now range from £12 6s. 3d. to £12 10s. per ton f.o.b. at the different ports for prompt parcels. As regards forward delivery, sales have been made as far ahead as March next at £11 13s. 9d. per ton, Beckton terms; and quotations have since been raised. The orders have mostly been sent by consumers direct; and as Germany has led the way in

R. & A. MAIN, Ltd.

Argyle Works, GLASGOW.

Telegrams: "GASMAIN, GLASGOW."

214-226, St. John Street, Clerkenwell Green, LONDON, E.C.

Telegrams: "GASMAIN, LONDON."

BRISTOL:
28, BATH STREET.
Telegraphic Address: "GOTHIC."

BIRMINGHAM:
1, OOZELLS STREET.
Telegraphic Address: "GOTHIC."

MANCHESTER:
87, BLACKFRIARS STREET.
Telegraphic Address: "GOTHIC."

THE

"Main" Cooker,

With Enamelled Grids and Shelf Guides.

SEVERAL COLOURS OF ENAMELLED LININGS.

Prices from - - £4 12s. 6d.

NEW SEASON'S LIST NOW READY.

the buying; London and Leith have so far received the larger share. Other countries, as well as the Colonies, are now also sending inquiries, which give promise of continued activity in the near future.

Nitrate of Soda is steady at 8s. per cwt. for fine quality.

LONDON, *Aug.* 12.

Tar Products.—This market is entirely overshadowed by a holiday feeling; the large makers and dealers being conspicuous by their absence. Benzols are a little steadier. Solvent, heavy, and crude naphthas are all saleable. Creosote is firm, with little offering. Pitch maintains its market value, though little or no business is reported in it. Anthracene is weak. Carbolic acid value is wavering For naphthalene there is more inquiry, with a better outlook for pressed quality. Toluol stands out rather as a feature at the moment; but whether the larger demand for it arises for solvent purposes, or for the manufacture of indigo, as is stated, is not verified. Remarkable variations in the value of tar are seen in the contracts that have been closed during the past few weeks.

To-day's values may be taken as: Tar, 16s. to 25s. 6d. Pitch, east coast, 33s.; west coast, 30s. Benzols, 90's, 8d.; 50's, 10d. Toluol, 1s. 2d. Solvent naphtha, 1s. 2½d. Heavy naphtha, 1s. Crude, 30 per cent., naphtha, 3⅝d. Creosote, 3¾d. Heavy oils, 62s. 6d. Carbolic acid, 60's, 2s.; 75's, 2s. 6d. Creosote salts, 50s. Anthracene, nominal, "A," 4d.; "B," 2½d.to 3d.

Sulphate of Ammonia.—Some fluctuations have been noted in this market during the past week; and a strong "bull" was rampant towards the end of the week. The market quotations, however, are not substantiated by actual business; and in many cases quotations are several shillings above the actual business transacted. From £12 3s. 9d. to £12 6s. 3d., less 3½ per cent., according to facilities of shipment, may be said to be about closing values.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—For the better qualities of round coal, the demand continues of the slowest possible character; but the output has been considerably restricted during the past week, owing to the more than usually extended holiday stoppages of the pits, and stocks are still not accumulating to any great extent. The result is that prices are firmly maintained at best rates, with a probability that certainly not later than September there will be some further advance on present quoted prices, which remain at 11s. 6d. to 12s. 6d. per ton for best Wigan Arley, 10s. to 11s. for Pemberton four-feet and seconds Arley, and 9s. to 9s. 6d. for common house coal. For other descriptions of fuel, the demand continues active all round, with rather a shortness of supplies, especially in the better qualities of engine fuel, the production of which is necessarily just now restricted by the very limited quantity of coal being screened for house-fire purposes. Prices continue strong at 8s. 9d. to 9s. per ton for steam and forge coals, 6s. 6d. to 6s. 9d. for best slack, 5s. 6d. to 5s. 9d. for medium, and 4s. 9d. to 5s. for common sorts, with a decided tendency to harden up on quotations for forward delivery. Coke is in very pressing request; Lancashire makers reporting an active demand not only locally, but from outside districts. Prices continue to advance. Notwithstanding the efforts which have been made by the coal merchants to obtain some modification of the special clauses that have been introduced in the contracts for the ensuing year, the Lancashire coalowners decline to make any concessions whatever. Here and there merchants, no doubt with the object of making sure of their supplies, have entered into contracts on these conditions; but generally they are still buying only from hand to mouth or under monthly contracts.

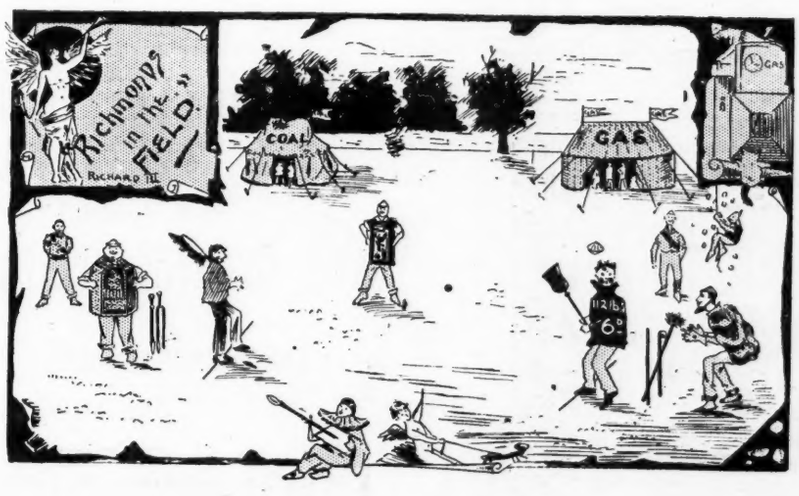
Northern Coal Trade.—There is increased activity in the Northern coal trade. The shipping season is a brisk one, and is now about at its height, for the foreign ports; and the coastwise shipments are beginning to improve. Best Northumbrian steam coals are very brisk, and collieries can scarcely meet the demand. The price for this class of coals is firm at 13s. per ton f.o.b.; while steam coals are also scarce and steady at from 6s. 3d. to 6s. 6d. per ton. There is a good demand for bunker coals, at about 10s. per ton f.o.b. in the Tyne; but household coals are slow of sale, and weak in price. In the gas coal trade, there is now an increasing activity; and in some instances prices are distinctly firmer. Best Durham gas coals are quoted 10s. per ton f.o.b.; and it is said that sales have been made at this price. Few contracts are offering, and these only for limited quantities; so that there is very little doing in contracting for gas coals at present. Manufacturing and coking coals are in good request, and are firm in price. Gas coke keeps in fair demand; and the quoted price is still 13s. 6d. per ton f.o.b., with a steady inquiry.

Scotch Coal Trade.—A good demand continues for all classes of coal. The best sorts of ell are in strong request; but the lower qualities are not being so well disposed of. Splint continues in great demand, with prices firm at the advance rate. The quotations are: Main, 9s per ton f.o.b. Glasgow, ell 9s. 3d. to 10s. 6d., and splint 10s. 3d. to 10s. 6d. The shipments for the week amounted to 198,046 tons—an increase upon the preceding week of 20,112 tons; but a decrease upon the corresponding week of last year of 155,023 tons. For the year to date, the total shipments have been 5,097,481 tons—a decrease upon the corresponding period of last year of 539,662 tons.

Sales of Shares.—Mr. W. W. R. Spelman recently sold 250 ordinary £10 shares in the Norwich Water Company at prices ranging from £19 to £19 3s. each. Last Monday, at Eastbourne, Mr. J. Easter disposed of three £10 original shares in the Eastbourne Gas Company at £35 15s. each; others fetching £35 7s. 6d., £35 2s. 6d., and £35 apiece.

Suffocation by Gas.—Ellen Taylor, 35, an unmarried woman, of Hebden Bridge, Yorkshire, was last Wednesday reported to have been found dead in a bedroom at her brother's empty house. She had apparently been suffocated by inhaling gas. The door was found closed, the crevices were stuffed with brown paper, and the gas was turned full on. Round the head of deceased was tied a handkerchief. She had suffered from influenza and depression.

OUR TEST MATCH—WITH APOLOGIES TO THE ⬭



A New Water Supply for Anglesey.—Mr. R. G. Thomas, Chairman of the Menai Bridge District Council, has propounded a scheme of water supply from one source in the Snowdon Mountains for the whole of the island of Anglesey and certain districts on the Carnarvonshire side of the Menai Straits on the line of route of the proposed mains, which would have to be carried under the straits, unless permission can be obtained to convey them over either the Britannia Tubular Bridge or the Menai Suspension Bridge. Mr. Thomas estimates that his scheme will cost £300,000 to carry out, and he proposes the formation of a Joint Water Board, consisting of representatives of the local governing bodies.

Fatal Explosion at the Oil-Gas Works of the Lancashire and Yorkshire Railway Company.—Last Sunday morning, about nine o'clock, an explosion, unfortunately resulting in a death, took place at the oil-gas works of the Lancashire and Yorkshire Railway Company at Cheetham, Manchester. The report was followed by a long flame shooting upwards, accompanied by dense volumes of black smoke; and the cause was the explosion of a holder of compressed oil gas in charge of a workman named Wren, who was so badly injured that he died at noon. The gas is made in the arches under the railway; and the one where Wren was contained nine gas receivers and three oil-tanks. One of the Company's gas makers is reported as stating that working in the arches was attended with so much risk that the employees were strictly forbidden to take in matches with them; and he also states that the explosion happened immediately after an engine had passed over the line. The arch was examined on Sunday morning by the Assistant-Engineer of the Company; and on the ballast being removed it was found that the great heat of the flames had not affected the asphalting on the crown, and the line was pronounced to be perfectly safe. The property in the neighbourhood was considerably damaged; but beyond the fatality to Wren, there were no cases of serious personal injury.

Bravery of a Gas Workman Rewarded.—A pleasant incident of the annual meeting of the Maidstone Gas Company, reported elsewhere, was the presentation to William Stevens, one of the Company's employees, of the Royal Humane Society's certificate, by the Chairman (Mr. W. Haynes), in the presence of the Directors, shareholders, and workmen. The circumstances under which the reward was gained were the following: On the 29th of June, Sidney Eve, one of the Company's servants, was unmooring a barge, when he was overpowered and fell into the River Medway. Stevens, who had on three previous occasions rescued people from drowning, immediately jumped into the river, and brought Eve to land. In making the presentation, Mr. Haynes remarked that they must all be proud to think they had in their midst a man who performed so brave an act and who did it as a simple act of duty, and without thought of reward. The employees at the gas-works also purchased a gold medal, encircled with a laurel wreath, and Mr. Haynes handed this to Stevens, and spoke of the hearty appreciation the old British pluck he had shown had met with. The certificate was signed by the Duke of York, President of the Society, and Sir Digby Morant, the Secretary. The medal bore the inscription: "Presented to Wm. Stevens, jun., by his fellow-workmen, for his bravery of life saving, June 29, 1899.

The Assessment of Water-Mains.—An example of the reckless manner in which the assessment of mains and other works is sometimes carried out is afforded at Devonport. By the extension of the boundary of the borough, the District of St. Budeaux, which is supplied with water by the Plymouth Corporation, has been added to the municipal area. The Borough Assessment Committee increased the assessment of the mains from £89 to £296; but, on appeal by the Plymouth Corporation, the amount has been reduced to the old figure.

Water Supply of Cape Town Suburbs.—Considerable controversy has taken place of late respecting the scheme for the purchase by some of the Local Authorities of the undertaking of the Cape Town District Water Company. An Act was obtained last year empowering the authorities to buy on arbitration terms; but the Town Councils of Woodhouse and Claremont, which are those most concerned, have been considering whether they could not avoid fulfilment of the bargain. One of the conditions, or "servitudes" as they are called, under which the Company supply water is that a certain quantity shall be provided daily for a brewery and for residents on land belonging thereto. The Municipal Authority say, however, that they have learnt with surprise that they will be precluded, under this agreement, from supplying any other brewery; while if the estate should be cut up into building lots, they are under obligation to lay down pipes at their own expense, and supply water at ordinary cost. The Woodstock Council practically decided to repudiate the joint purchase of the undertaking. According to the latest report, the Joint Committee of the Woodstock and Claremont Councils have decided to proceed with the purchase. It is explained that there was really no other course open to them, as the Company might, if they had chosen to do so, have proceeded, in the absence of the Municipalities, to appoint arbitrators and get the price fixed. The only consolation the Authorities can find in the situation is that the arbitrators must now take into account the value of the servitudes which the Councils will take over with the works.

The Midland and Great Northern Joint Railway Committee have placed with Messrs. R. Dempster and Sons, Limited, of Elland, the order for a 46-feet cast-iron tank and gasholder, and two purifiers, for their Melton Constable works.

Among the tenders accepted for the improvements to be carried out at the Athlone Gas-Works is one by the Barrowfield Iron-Works, Limited, for roofing appliances and gasholders, and another by Messrs. John Brown and Co., Limited, for retorts.

Messrs. Crossley Bros, Limited, have just put down at the Patros Spinning Mills in Greece, a gas-engine of 20-horse power, combined with Dowson gas plant; and they have recently supplied their engines in connection with a fruit-cleaning plant at Piræus.

Messrs. Joseph Taylor and Co., of Bolton, have in hand saturators, similar to those supplied to Croydon, Nottingham, Hull, and Sunderland, with double ammonia pipes and plate-lead shelf and lips for timber front and side lags, &c., for the Wigan Corporation Gas Department; also a repeat order for the Sheffield Chemical Company.

LATEST DEVELOPMENT
IN
GAS-COOKERS

WRIGHT'S PATENT,
BY WHICH ALL THE
ADVANTAGES OF LOOSE BURNERS
ARE OBTAINED
WITHOUT
ANY OF THE DISADVANTAGES.

NO EXTRA CHARGE IS MADE
FOR THESE IMPROVEMENTS.

JOHN WRIGHT & CO.
LIMITED,
LONDON & BIRMINGHAM.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'N ,Managing Director,
160, 161, & 1 PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKLEMANN'S ORIGINAL "VOLCANIC" FIRE CEMENT and "VOLCUM" PASTE. Always ready for use in GAS-WORKS. Resists 4500° Fahr.

ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street, E.C.
"Volcanism, London."

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER LINCOLN."
[For Illustrated Advertisement, see Aug. 1, p. 332.]

AMMONIACAL LIQUOR wanted.
BROTHERTON AND Co., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SALOP.

SPENT OXIDE wanted.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1769.

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BENZOL, specially made for the Enrichment of Gas.
ELLISON AND MITCHELL, LIMITED, Kilnhurst, near ROTHERHAM.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BIRMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

PRACTICAL RETORT SETTER.

GEORGE NUTTALL, 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

GAS TAR wanted.
BROTHERTON AND Co., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SHEFFIELD CHEMICAL COMPANY, LIMITED.
BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

MELROSE CYCLES

SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

WANTED, a Draughtsman. One accustomed to Bench and Furnace Work preferred.
Apply to JONAS DRAKE AND SON, Ovenden, HALIFAX.

WANTED, a man for Smithing and general repairs. One used to pipe work preferred. Must be willing to do yard work in spare time. Wages, 26s.
Apply to R. WATSON, Gas-Works, HERTFORD.

WANTED immediately, handy Man for Water-Works, able to work small Worthington Engine and Boiler, lay on Services, &c. Wages, 25s.
Apply, by letter, to No. 3323, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS MAN wanted (single handed) to take charge of small Colliery Plant near Durham. State Wages required and Experience. House and Coal free.
Apply, by letter, to No. 3316, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Two Leading Stokers, accustomed to Regenerative Settings and West's Machine Stoking. For Steady, reliable Men, position permanent.
Apply, by letter, stating Age, References, and Wages expected, to No. 3311, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good Stoker used to Shovel Charging. One having had experience with Engine and Exhauster preferred. Permanency to a strictly sober and reliable Man. Wages, 30s. per week in Winter months, and 26s. during Summer.
Apply, stating Age, and whether Married or Single, with References, to G. MOAT, Gas-Works, Purston, PONTEFRACT.

OUTDOOR INSPECTOR AND HEAD FITTER.

WANTED, a good, reliable man, thoroughly competent as a Fitter and Main and Service Layer, and well up in all the modern requirements of a Gas Company's fitting business. The highest Testimonials are indispensable.
State Age, Experience, and Wages required, and enclose *copies* of three recent Testimonials, to No. 3322, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LONGTON GAS DEPARTMENT.

WANTED, a thoroughly reliable young Man as CLERK. Must be accustomed to the routine of a Gas Office.
Salary, £1 5s. per week.
Applications, in Candidates' own handwriting, stating Age and Experience, and accompanied by *copies* of not more than two Testimonials of recent date, to be delivered not later than Tuesday, Aug. 22, 1899, endorsed "Clerk," to the SECRETARY, Gas-Works, Longton, STAFFS.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

STREET-MAIN SUPERINTENDENT WANTED.

THE Corporation invite Applications for the vacant Situation of STREET-MAIN SUPERINTENDENT of their Gas Department.
No person need apply who has not a practical experience in all the duties appertaining to such a position.
Applications, accompanied by not more than three *copies* of recent Testimonials, and stating Age, Experience, present Employment, &c., must be lodged with the Subscriber not later than the 21st inst.
J. D. MARWICK,
Town Clerk.
City Chambers, Glasgow,
Aug. 1, 1899.

SEASON 1899.

BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

TO GAS-WORKS MANAGERS.

WANTED, a Working Manager for a small Gas-Works in Spain. Applicants must speak and write Spanish.
Apply, by letter, to No. 3325, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, immediately, for a small Gas-Works, a steady young man as STOKER. One used to Engine and Exhauster, and who would make himself generally useful.
Apply, by letter, to No. 3324, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

RHYL URBAN DISTRICT COUNCIL.

WORKING Foreman wanted at the Gas-Works. Must be used to the working of Regenerative Furnaces, and a good Carbonizer. Will not be called upon to do any Stoking work, but will be required to make himself generally useful.
Wages, 35s. per week.
Make, 40 millions.
Applications, with two recent Testimonials, to be forwarded to the undersigned not later than Monday, the 21st inst.
LEONARD G. HALL,
Engineer and Manager.
Gas-Works, Rhyl,
Aug. 9, 1899.

THE GASLIGHT AND COKE COMPANY.

WANTED, at the Beckton Station of the above-named Company, an ASSISTANT ENGINEER having the following qualifications—viz.: Three Years' Professional training as Pupil, Two Years' service as Gas Engineer's Assistant, with a general knowledge of the routine of a Gas-Works and a fair knowledge of mechanical draughtsmanship.
He will be required to live on the Works, where a Residence, with Gas and Fuel, is provided.
Commencing Salary according to qualifications, rising by annual increases to £250 per annum.
Applications, with Particulars of Qualifications and References, to be made, by letter, to the undersigned not later than the 14th prox.
By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.
Chief Office: Horseferry Road,
Westminster, S.W., Aug. 14, 1899.

WANTED, One Good Second-Hand PURIFIER, 12 to 14 feet square, with 10-inch or 12-inch Connections.
Particulars to R. S. CHURCH, Engineer, Gas-Works, CHICHESTER.

BUSINESS FOR SALE.

TO Let or Sell, with Immediate Entry—The GAS-WORKS and PLANT at Kincardine-on-Forth as a going concern, with Manager's House, &c.
Offers to be lodged with CLARK AND ROSS, Solicitors, KINCARDINE.

FOR SALE—Horizontal Engine and EXHAUSTER, with 10-inch Valves, complete, £35. STATION METER, £16. GASHOLDER (modern), double lift (80,000 cubic feet), TAR WATER TANKS, and CONDENSERS, £5 per ton on rail.
Full Particulars on application to HARGREAVES AND SMITH, Metal Merchants, Dudley Road, WOLVERHAMPTON.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

FOR SALE, cheap to clear—
TOWER SCRUBBER (Walker), 5 ft. by 25 ft. high, complete.
STATION METER, 8-inch, complete and perfect.
EXHAUSTER and ENGINE, combined (Waller), 9-inch Valves, Governors, &c., complete.
GASHOLDER, 35 ft. by 14 ft. deep, only Six Years old.
CAST-IRON TANK, 31 ft. dia., 12 ft. deep, nearly new.
Four 10-feet PURIFIERS, Centre-Valve and Connections.
EXHAUSTERS, sizes from 4000 to 30,000 Cubic Feet per hour in stock.
J. FIRTH BLAKELEY & Co., Gas Engineers, Thornhill, DEWSBURY.

FOR SALE—Station Meter (4000 cubic feet per hour capacity), with 6-inch Four-Way Valve and Connections. In good working condition. Replaced by larger one.
Offers to R. WATSON, Gas-Works, HERTFORD.

FOR SALE—Gas Plant, comprising two Holders (Total Capacity 35,000 Cubic Feet), Scrubbers, Purifiers, Pump, Tar-Tank, Fire-Brick Retorts, &c., &c.
May be viewed upon application to ASHWELL AND NESBIT, LIMITED, Engineers, LEICESTER.

ROTHERHAM CORPORATION GAS DEPARTMENT.

FOR SALE—a second-hand Rotary EXHAUSTER, capable of passing 40,000 cubic feet per hour, in splendid condition. Can be seen any time. No reasonable offer refused.
FRANK A. WINSTANLEY, Engineer and Manager.

LEIGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council invite TENDERS for the purchase of TAR produced at their Works for a period of Twelve Months.
Forms of Tender and further Particulars may be obtained on application to the Manager, Mr. John Foster, Gas-Works, Leigh.
Tenders to be sealed, and delivered to me, the undersigned, at or before Twelve o'clock noon, on Saturday, the 19th day of August, 1899.
By order,
PEREGRINE THOMAS,
Clerk and Solicitor.
Town Hall, Leigh, Lancs.,
Aug. 2, 1899.

NORTHAMPTON GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors are prepared to receive TENDERS for the purchase and removal of the surplus TAR produced at their Works for a period of One or Two Years from Oct. 1 next.
The quantity produced is about 3000 Tons per annum.
Further Particulars may be obtained on application.
The Directors do not bind themselves to accept any Tender.
Tenders, marked "Tender for Tar," to be delivered at the Company's Office on or before Tuesday, Aug. 29 next.
JOHN EUNSON,
Engineer.
Gas-Works, Northampton,
Aug. 9, 1899.

BRIERLEY HILL DISTRICT GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors of the above Company are prepared to receive TENDERS for surplus TAR made at their Brierley Hill and Kingswinford Works for One Year ending the 30th of June, 1900, delivered into Boats, at the former place in One Hour and at the latter in Twelve Hours.
Tenders to be addressed to the Chairman, and delivered not later than the 25th inst.
The Directors do not bind themselves to accept the highest or any Tender.
HENRY M. JACKSON,
Secretary.
Gas-Works, Brierley Hill,
Aug. 9, 1899.

BOROUGH OF CHORLEY.

THE Corporation invite Tenders for the following, for Twelve Months from the 1st of September next:—
1.—Purchase of surplus TAR produced at their Gas-Works.
2.—Supply of LUMP LIME or LIME CHIPPINGS, 150 Tons.
3.—Supply of VITRIOL, 100 to 120 Tons.
4.—Supply of CAST-IRON PIPES, 2-inch to 20-inch.
Form of Tender and any other Information may be obtained on application to Mr. John Mc. Cubbin, Gas Manager.
Tenders, duly endorsed, to be sent to me on or before Tuesday, the 22nd of August, 1899.
The Corporation do not bind themselves to accept any Tender.
By order,
JNO. MILLS,
Town Clerk.

MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.
(INCORPORATED BY ACT OF PARLIAMENT, 1867.)

NOTICE is Hereby Given, that the SIXTY-FIFTH ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of this Company will be held in the Board-Room, at the Works, Mitcham, in the County of Surrey, on Tuesday, the 29th day of August, 1899, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and a Statement of the Accounts for the Half Year ended the 30th day of June last, to declare a Dividend, to reconsider the Remuneration of the Auditors, and for General Business.
The TRANSFER BOOKS WILL BE CLOSED from the 14th inst. until after the Meeting.
By order,
BENJAMIN GREEN,
Secretary and Manager.
Offices and Works,
Western Road, Mitcham,
Aug. 8, 1899.

COLNEY HATCH GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, New Southgate, on Thursday, the 24th day of August inst., at Five o'clock in the Evening precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 30th of June, 1899, to declare Dividends, and for other purposes.
By order,
ERNEST L. BURTON,
Secretary.
Secretary's Offices: 5, Great Winchester Street,
London, E.C., Aug. 8, 1899.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the "Bell" Hotel, Bromley, Kent, on Thursday, the 17th day of August, at Six o'clock p.m. precisely, to receive the Report of the Directors, the Balance-Sheet certified by the Auditors, to declare a Dividend, and for General Purposes.
The TRANSFER BOOKS WILL BE CLOSED from the 3rd to the 17th of August, 1899, both days inclusive.
By order of the Board,
HENRY W. AMOS,
Secretary.
Offices: At the Works,
Bromley, Kent, Aug. 1, 1899.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 26th day of August inst., at Three o'clock precisely, to receive the Report of the Directors, and Statement of Accounts for the Half Year ended the 30th day of June, 1899, to declare a Dividend for the same period, and for the Election of Two Directors and Two Auditors for the Ensuing Year, and for transacting General Business.
The TRANSFER BOOKS WILL BE CLOSED for the CONSOLIDATED STOCKS from the 11th to the 28th of August inst., both days inclusive.
By order of the Board,
JAMES RANDALL,
Secretary.
Offices of the Company: Willoughby Lane,
Tottenham, Aug. 4, 1899.

THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED.

NOTICE is Hereby Given, that the Creditors of the above-named Company are required, on or before Monday, the 18th day of September, 1899, to send their NAMES and ADDRESSES and the PARTICULARS of their DEBTS or CLAIMS, and the Names and Addresses of their Solicitors (if any), to John Nicoll, of 111, Palace Chambers, Westminster, S.W., the Liquidator of the said Company; and, if so required by notice in writing from the said Liquidator, are, by their Solicitors, to come in and prove their said Debts or Claims at such time and place as shall be specified in such notice, or in default thereof they will be excluded from the benefit of any distribution made before such Debts are proved.
Dated this 4th day of August, 1899.
LUMLEY AND LUMLEY,
15, Old Jewry Chambers, E.C.,
Solicitors to the above-named Liquidator.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

TO CAPITALISTS AND OTHERS.

SWANSEA, GLAMORGANSHIRE.

JOHN M. LEEDER AND SON have received instructions from the Directors of the Swansea Gaslight Company to offer for SALE BY PUBLIC AUCTION, at the Royal Hotel, High Street, Swansea, on Tuesday, Sept. 5, 1899, at Half-Past Two for Three o'clock precisely in the afternoon, in 310 lots
£20,000
NEW ORDINARY STOCK, and
£6000
THREE-AND-A-HALF PER CENT. PERPETUAL DEBENTURE STOCK
OF THE
SWANSEA GASLIGHT COMPANY;
being part of the additional Capital of the Company authorized to be raised by the Swansea Gas Act, 1898, and pursuant to the provisions and conditions therein contained.
Purchasers of the New Ordinary Stock, 1898, will be entitled to three months' interest at 5 per cent. per annum as from the 1st of October, 1899, payable on the 6th of April, 1900; and purchasers of 3½ per cent. Perpetual Debenture Stock, 1898, to three months' interest due and payable on the 1st of January, 1900.
Particulars, with Conditions of Sale, containing all necessary Information, may be obtained on application to the SECRETARY and MANAGER of the Swansea Gaslight Company, Oystermouth Road, SWANSEA; or to the AUCTIONEERS at their Offices, 46, Waterloo Street, SWANSEA.

NITRATE of Thorium and Cerium.
FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

ENRICH YOUR GAS
WITH CHEAP
BENZOL
SPECIALLY PREPARED, FREE FROM SULPHUR.
AT to-day's Price of Benzol, Illuminating POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.
Apply to SADLER & CO., MIDDLESBROUGH.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.
Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.
Telegraphic Address: "PARKINSON, NEWCASTLE."

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

We note an advertisement in the "JOURNAL," under the name of the NEW CONVEYOR COMPANY, stating that they had taken over the business of the AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED; and, as it may create a false impression, we beg to say there are no valid patents existing in connection with Inclined Retorts (beyond a few small and subsidiary ones, dealing with details). We are prepared to erect Inclined Retort Plants, with Conveying and Elevating Machinery, Overhead Tanks, Hoppers, and Measuring Chambers, complete and free of Royalty. In the list of places given, only a few were erected by the New Conveyor Company—nearly all the remainder being erected by the undersigned.

JONAS DRAKE & SON, OVENDEN, HALIFAX.
GRAHAM, MORTON, & CO., LIMITED, LEEDS.
W. J. JENKINS & CO., LIMITED, RETFORD.
WINSTANLEY COMPANY, COVENTRY.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

WELDON MUD

FOR

GAS PURIFICATION.

For use in the

RECOVERY OF SULPHUR,

ALSO

Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:

GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

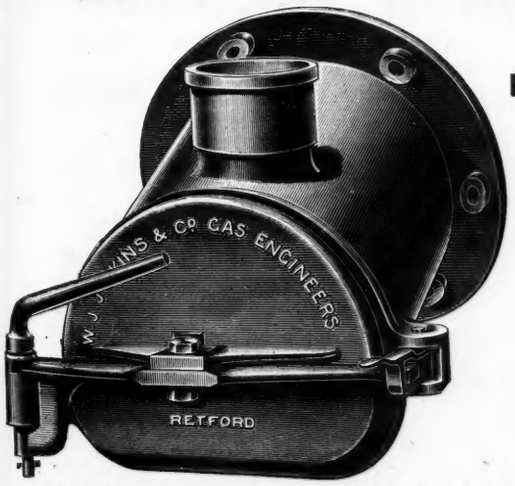
For Price, &c., apply to the

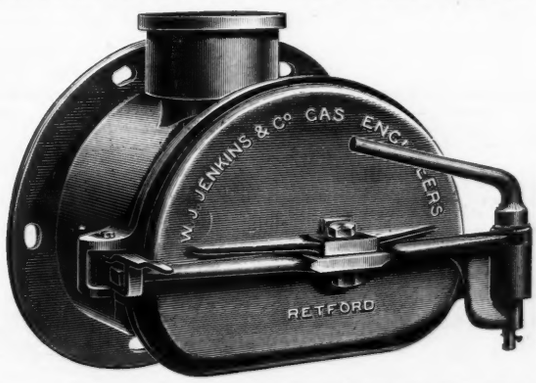
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

JAMES MILNE & SON, LTD.,
GAS ENGINEERS
MILTON HOUSE WORKS EDINBURGH.
LONDON. —— LEEDS. —— GLASGOW.

MOUTHPIECES

WITH SELF-SEALING LIDS FOR
HORIZONTAL AND INCLINED RETORTS





W. J. JENKINS & CO., LTD., RETFORD.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

HOLMSIDE
GAS COALS.
Present Daily Produce over 5000 Tons.
Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.
Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

JAMES OAKES & CO.
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

THE
"FARRINGDON" LANTERN
FITTED WITH STEEL ENAMELLED WHITE REFLECTOR.

This Favourite Lamp has been largely adopted by many Corporations and Lighting Authorities.

Fitted with the Patent Talbot Bye-Pass Tap and Clay's Anti-Vibratory Coil and No. 4 New Welsbach Burner.

H. GREENE & SONS, LTD.
19, Farringdon Rd., London, E.C.
Telephone: 1215 HOLBORN.
Telegrams: "LUMINOSITY, LONDON."

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

THE WIGAN COAL & IRON CO., LIMTD.,
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.
Midland and West of England District Office: 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.
Telegraphic Address: "WIGAN, BIRMINGHAM." Telephone No. 200.
London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.
Telegraphic Address: "PARKER, LONDON"

WORKMANSHIP and MATERIALS OF THE HIGHEST QUALITY.
PECKETT'S LOCOMOTIVES
Built to any Specification or Gauge.
PECKETT & SONS, Atlas Locomotive Works, **BRISTOL.**

THE SUNLIGHT INCANDESCENT GAS-BURNER

Applications for **AGENCIES** now being received.

NOTE THESE FEATURES:

A1. WHITE MANTLES.
Longest Lived and Highest Candle Power.

'SUNLIGHT' TINTED MANTLES.
Strongest and Pleasantest Colour.

These are INTERCHANGEABLE on same Burner.

BURNERS WITH CHIMNEYS.
Cheapest in the Market.

CHIMNEYLESS BURNERS.
Cheapest, Simplest, and Most Efficient.

SELF-LIGHTER.
Only Efficient System.

A great sensation with this unique combination of features is promised to our Agents for the coming season. Any firm of standing, applying early enough, will be very favourably dealt with.

An early visit to the London Show-Rooms is especially solicited.

SPECIAL NOTICE.

Sunlight Tinted Mantles have been declared by the Courts to be "as far asunder as the Poles" from the Welsbach System, and we guarantee that our

SUNLIGHT WHITE MANTLES

are NO Infringement of that or any other Patent, and are made under a Series of Independent Patents, and by an entirely New Process.

We give with every Mantle sold an absolute indemnity to both seller and user against all molestation on this account.

Price Lists, &c., on application.

New Sunlight Incandescent Co., Ltd.,

33 & 34, SHOE LANE, LONDON, E.C.

Telegrams: "IGNIFLUOUS." A.B.C. and A1. Codes used. Telephone: No. 947 Holborn.

Telegrams: "Robustness, London."

RETORT-HOUSE, SETTINGS, & RAILWAY

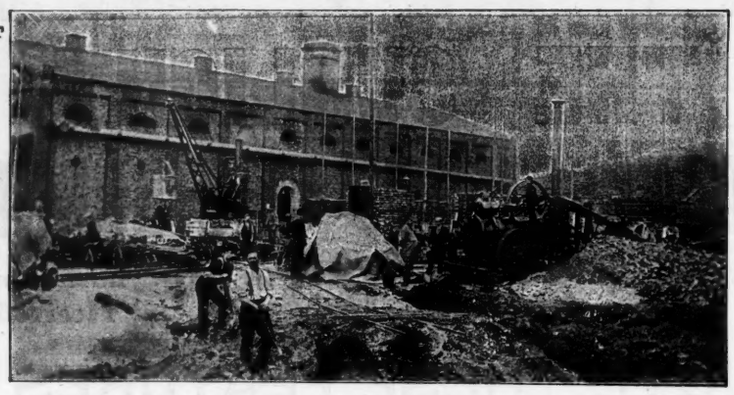
IN COURSE OF ERECTION BY OUR OWN WORKMEN.

Telephone: No. 756 Bank.

Plans, Estimates, and Specifications prepared and submitted.

Special Facilities for RECONSTRUCTING GAS-WORKS.

CONDENSERS, SCRUBBERS, WASHERS, EXHAUSTERS, TANKS, and every REQUISITE.



A SPECIALITY.

INCLINED and FLOOR-LEVEL SETTINGS with or without REGENERATIVE or GENERATOR FURNACES, with or without IRONWORK. COMPLETE RE-SETTING.

J. & H. ROBUS, Engineers and Contractors, 20, BUCKLERSBURY, LONDON, E.C.

GASHOLDER TANKS AND MAIN LAYING.

H. KIRKHAM'S PATENT "IMPERIAL" WASHER-SCRUBBER.

TESTIMONIAL

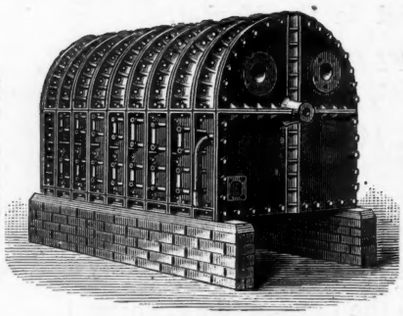
The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.

Dear Sir,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,
RAPHAEL HERRING, Engineer.



EFFICIENCY GUARANTEED.

Estimates given for a complete set of Segments for one wheel, or for refitting the whole number of wheels in a machine, also for Washer-Scrubbers complete.

The Scrubbing Devices are metal scrolls fixed in cages of segmental form, which can be readily and successively removed from the wheels through a manhole on the top or side of the machine, and the enclosed Scrubbing Devices taken out, cleaned, and replaced without the delay that necessarily takes place when the entire scrubbing material of the whole wheel has to be dealt with in one operation—thus effecting an important saving in time and labour. These Cages can be applied to the wheels of any machines of the type shown, and will increase their efficiency above 20 per cent.

The Scrubbing Devices are unequalled for extracting the whole of the Ammonia and a very large proportion of the Carbonic Acid and Sulphuretted Hydrogen from the Gas; and, if required, the strength of the Ammoniacal Liquor can be worked up to 30 oz. and above, which greatly reduces the quantity of Oxide or Lime, and also the amount of Labour for Purification.

OFFICE: 25, Victoria Street, Westminster, LONDON, S.W.

MOBBERLEY & PERRY

STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

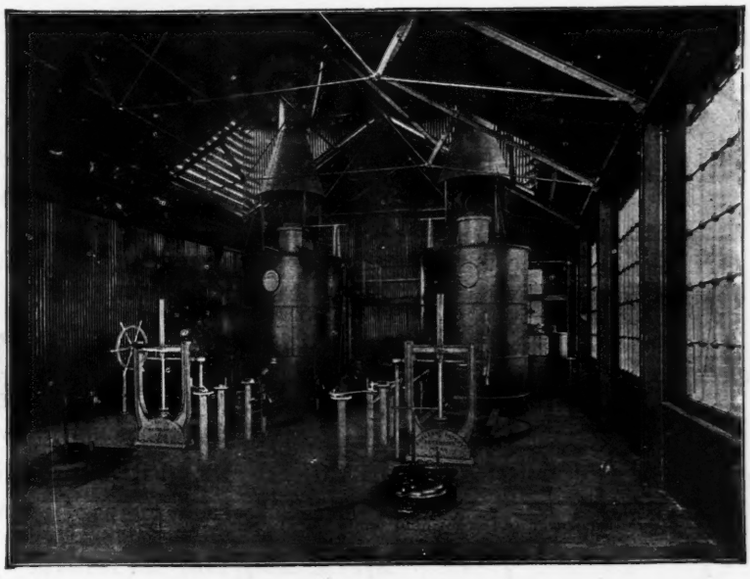
London Agents: Contractors for the erection of Retort-Benches complete.

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

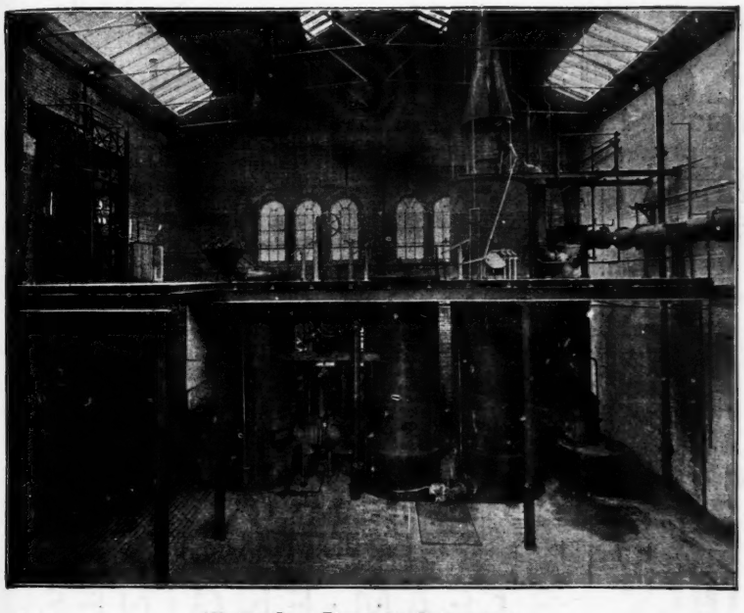
S. Cutler & Sons,
Millwall, London.

GASHOLDERS.

CARBURETTED WATER-GAS PLANT.



Water-Gas Plant at Southall.



Water-Gas Plant at Folkestone.

Carburetted Water-Gas Installations.

HORNSEY.
HASTINGS.
BUENOS AYRES.
SOUTHEND.
PLYMOUTH.
SOUTHALL.
HARROW.
HORSHAM.
FOLKESTONE.
BEXHILL.

SOUTHEND (2nd Order).
PLYMOUTH (2nd Order).
SOUTHALL (2nd Order).
FOLKESTONE (2nd Order).

CUTLER'S PATENT GUIDE-FRAMING FOR GASHOLDERS

ADOPTED FOR
MANY IMPORTANT
GASHOLDERS.

OIL-TANKS.

EVERY DESCRIPTION OF GAS-WORKS APPARATUS.

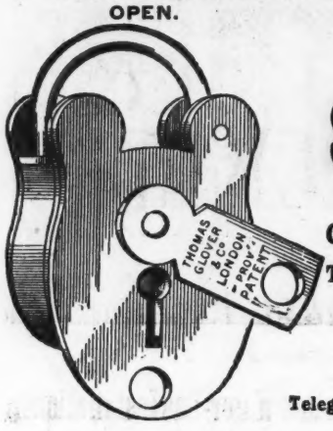
Water-Gas Plant at Southend.

ESTABLISHED 1844. **ORIGINAL MAKERS.** ESTABLISHED 1844.

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;
The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S
PATENT
SECURE PADLOCK
PREVENTS TAMPERING WITH THE
CASH-BOXES OF PREPAYMENT METERS.
The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

CLOSED.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

THOMAS GLOVER & CO., LTD.,
DRY GAS-METER MANUFACTURERS,
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 28, BATH STREET. *Telegraphic Address: "GOTHIC."* **Telephone No. 1005.**

BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC."*

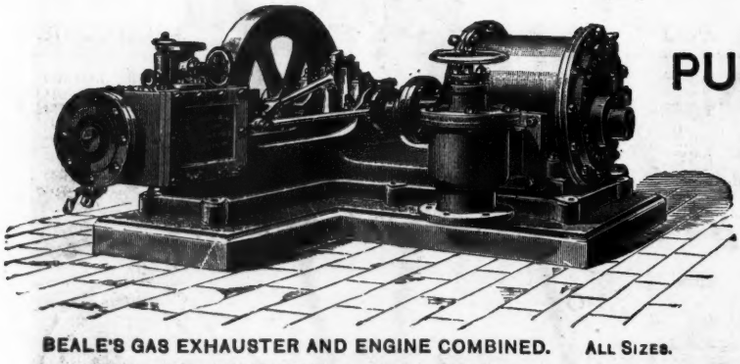
MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."* **Telephone No. 3298.**

GLASGOW: ARGYLE WORKS, KINNING PARK. *Telegraphic Address: "GASMAIN."* **Telephone No. 1525 South Side.**

R. LAIDLAW & SON,
ENGINEERS & IRONFOUNDERS,

CAST-IRON PIPES
ALL SIZES.

MANUFACTURERS OF
STEAM-ENGINES,
EXHAUSTERS,
VALVES,
AND
PUMPING-ENGINES.



BEALE'S GAS EXHAUSTER AND ENGINE COMBINED. ALL SIZES.

ALL KINDS OF
GAS AND WATER APPARATUS.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

ASHMORE, BENSON, PEASE, & CO., Ltd.

HAVE OPENED AN

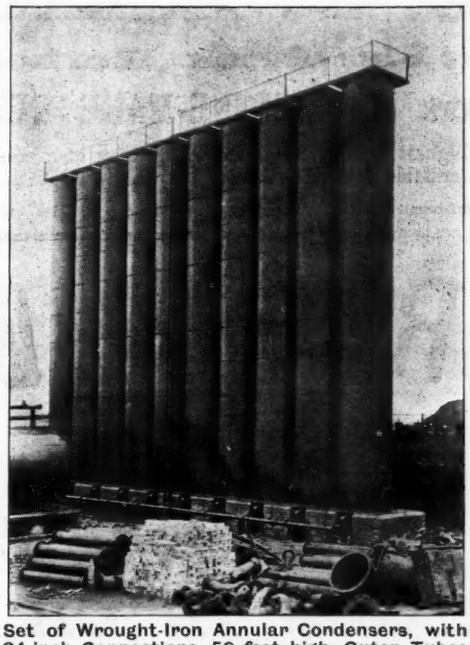
ELECTRICAL DEPARTMENT.

Complete Installations for Light or Power Erected.

SOLE MAKERS OF THE

"INVICTA" ACCUMULATOR.

GASHOLDERS.
PURIFIERS.
SCRUBBERS.
WASHERS.
VALVES.
ROOFS.



Set of Wrought-Iron Annular Condensers, with 24-inch Connections, 50 feet high, Outer Tubes 6 feet diameter, Inner Tubes 5 feet diameter.

CONDENSERS.
SULPHATE OF AMMONIA PLANTS.
RETORT-FITTINGS.
HYDRAULIC AND FOUL MAINS.
STEEL AND IRON PIPES.

ASHMORE, BENSON, PEASE, & CO., LTD.

Gas and Electrical Engineers,

STOCKTON-ON-TEES.

Telegrams: "GASHOLDER, STOCKTON-ON-TEES." "APPARATUS, LONDON."

London Office: 181, QUEEN VICTORIA, STREET, E.C.

Paris Office: 3, SQ. DES BATIGNOLLES.

BOWENS' Ltd. Successors,
STOURBRIDGE.
MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

ARROL-FOULIS
Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.
Full Particulars may be obtained from the Sole Makers,
SIR WILLIAM ARROL & CO., Limited,
GLASGOW.
[See Illustrated Advertisement, Aug. 1, p. 278.]

OSLER,
BIRMINGHAM.
MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

WILLIAM INGHAM & SONS,
Incorporated with the Leeds Fire-Clay Company, Ltd.,
WORTLEY FIRE-CLAY WORKS,
Near LEEDS,
Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—
1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.
PATENT
MACHINE-MADE GAS-RETORTS.

G. & J. HAIGH,
Raven's Lodge Fire-Brick Works, DEWSBURY.
Manufacturers of MACHINE-MADE RETORTS and
FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character suitable for GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.
For Prices and Analysis, apply as above.

OIL FOR GAS MAKING
PURE DISTILLATE.
HOMOGENEOUS IN CHARACTER.
NO MIXTURE.
CAN BE STORED SAFELY ANYWHERE.
FLASH POINT GUARANTEED OVER 200° FAHR.
(ABEL'S CLOSED TEST.)
ANGLO-CAUCASIAN OIL COMPANY, LTD.
8, 9, 10, & 11, LIME STREET, LONDON, E.C.
INDIA BUILDINGS, CROSS ST., MANCHESTER.

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

Manufacturers of Glasshouse Pots and Crucibles of every kind.
Established 1836.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.
WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

MACKRELL BROS.,
Buslingthorpe Lane, LEEDS,
Manufacturers of
IMPROVED GAS-METER PERSIANS.

UNSURPASSED FOR QUALITY AND VALUE.

MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB. FT. CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
SPECIALITY
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
IT IS 300 FT DIAM. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

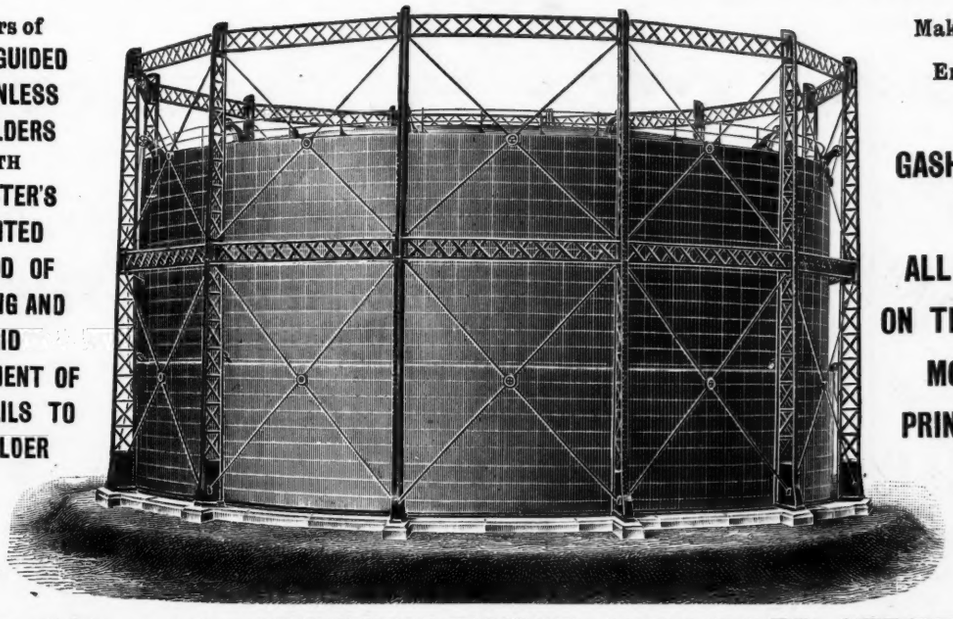
London Office: 60, QUEEN VICTORIA STREET, E.C.
Telegraphic Addresses: "GAS, LEEDS." "ECLARAGE LONDON."

R. & J. DEMPSTER, LTD., GAS PLANT WORKS,

Telegraphic Address "SCRUBBER, MANCHESTER." National Telephone Nos. 54 and 2296.

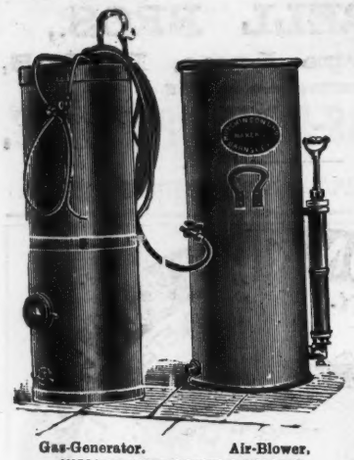
NEWTON HEATH, MANCHESTER.

Makers of SPIRAL GUIDED COLUMNLESS GASHOLDERS WITH DEMPSTER'S PATENTED METHOD OF SHEETING AND RIGID ATTACHMENT OF GUIDE-RAILS TO GASHOLDER



Makers and Erectors of GASHOLDERS OF ALL SIZES, ON THE MOST MODERN PRINCIPLES.

London Office: 165, GRESHAM HOUSE, OLD BROAD STREET, E.C.



Gas-Generator. Air-Blower.
IMPROVED LEAD-BURNING APPARATUS.

HUTCHINSON BROS. & CO., LTD.

GAS ENGINEERS, &c.

SPECIALITY.

LEAD WORK FOR SULPHATE OF AMMONIA PLANTS.

BEST QUALITY OF MATERIAL AND WORKMANSHIP.

SATURATORS, all Lead, or Strong Sheet Lead, in Wood Casing,

ACID TANKS, ELEVATORS, AND COCKS. LIQUOR AND LIME PUMPS OR INJECTORS.

Liquor-Cocks, Gauge Fittings, and Safety-Valves in Cast Iron.

HYDROMETERS, TEST-JARS (GLASS OR LEAD), COPPER SCOOPS, &c., &c.

IMPROVED LEAD-BURNING APPARATUS.

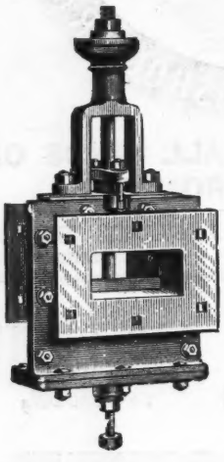
LEAD BURNERS SENT OUT TO REPAIRS.

FALCON WORKS BARNSLEY.

Telegrams: "HUTCHINSON BROS., BARNSLEY."

Telegraphic Address:
"CLAPHAM BROS., KEIGHLEY."

National Telephone
No: "KEIGHLEY 35."



"TRADE FOLLOWS THE FLAG"

CLAPHAM BROTHERS LTD

KEIGHLEY, YORKS. ESTABLISHED 1837

"SPECIALTIES"

London Representative:
THOMAS B. YOUNGER, C.E.
CHESTERFIELD HOUSE, 98, GREAT TOWER STREET.

Contractors to Her Majesty's Government.

WELLINGTON, NELSON, AND MARKET STREET WORKS.

LONDON OFFICE:
34, VICTORIA ST., WESTMINSTER, S.W.

TELEGRAPHIC ADDRESSES
"DRAKESON HALIFAX."
"ECLAIRAGE LONDON."

TELEPHONE No. 43.
"HALIFAX EXCHANGE"

GAS ENGINEERS.
CONTRACTORS.
IRONFOUNDERS.

JONAS DRAKE & SON

SOLE AGENTS FOR
HISLOP'S
PATENT REGENERATIVE FURNACES
—FOR—
ENGLAND, WALES & ABROAD.
RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES.
RESULTS GUARANTEED.

OVENDEN HALIFAX

RETORT SETTERS.
FURNACE BUILDERS.
ETC. ETC.

Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.

LONDON: Printed by WALTER KING (at the Office of King, Sell, & Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Aug. 15, 1899.